

SOCIOECONOMIC CHARACTERISTICS OF SOUTH CENTRAL KANSAS FARM INNOVATORS

by

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B. S., Kansas State University, 1958

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A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Economics and Sociology

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

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## INTRODUCTION

The rapid advance in the science and technology of agriculture in recent decades is one of the most significant achievements of modern times.

American farmers have produced about 75 percent more food and fiber annually during the last few years than they did in the years around 1910.<sup>1</sup>

In addition to greater total agricultural output, agricultural productivity is correspondingly increasing. Farm output per unit of total inputs has risen from an average of 0.5 percent in the 1920's to more than two percent in the 1950's.<sup>2</sup>

In contrast to the constantly increasing volume of agricultural products being produced there is also a continual reduction in the number of people living on farms.

It is estimated that the number of persons employed in agriculture has declined by 45 percent in the past 35 years and by 37 percent in the last 20 years. Correspondingly, the number of farms has declined by 36 percent since 1930 and 28 percent since 1945.<sup>3</sup>

This constantly changing composition of inputs is one of the most dynamic factors surrounding United States agriculture. In the last two decades labor has dropped from 56 percent to 30 percent of total agricultural inputs. Inputs of farm real estate (land, service and buildings) have remained constant while the counterpart of labor which includes all forms of mechani-

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<sup>1</sup>Lauren Soth, How Farm People Learn New Methods, National Planning Association Agriculture Committee on National Policy, Planning Pamphlet No. 79, p. 2.

<sup>2</sup>Changes in Farm Production and Efficiency, United States Department of Agriculture, p. 10.

<sup>3</sup>Earl O. Heady, "Education in Agriculture Relative to Economic Growth and Technical Advance," p. 4. Unpublished paper presented at American Vocational Association meetings, Chicago, December 9, 1959.

zation has increased greatly. Inputs of mechanical power and machinery have more than doubled, increasing from ten to 22 percent.<sup>4</sup> Agriculture has been "industrializing" very rapidly. The farmer has continued to use greater and greater amounts of resources from the non-farm side of the economy and has presented a production record far superior to that of any country in the world today.

Despite the much glamorized publicity and recognition which is continually invoked upon today's farmer, there is a question of how well he has maximized production from the resources at his disposal. The farmer has obtained a higher standard of living and received a larger monetary value from the factors of production, but in actuality how close has he come to reaching that theoretical maximum where marginal cost equals marginal revenue in the employment of all agricultural related resources?

If there are inefficiencies in agricultural production, in what areas do these inefficiencies lie? This is a question which would involve a multitude of answers possibly stemming from a comprehensive area approach.

The goal of this thesis is to analyze one of many possible areas of inefficiency, namely the circumstances and relationships surrounding the adoption by farmers of innovations in farm production practices. As was previously mentioned, inputs of mechanical power have doubled from 1940 to 1960 and have been one of the most important reasons for the farmers' success. The characteristic question surrounding this statement is, why did these inputs of mechanical power only double rather than triple or quadruple?

This thesis will attempt to answer this question by analyzing a typical group of forty-two outstanding farmers in south central Kansas who have differed in their rates of acceptance of innovations, and may provide insight into

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<sup>4</sup>Changes in Farm Production and Efficiency, p. 10.

the reasons for a possibly curtailed national growth rate in the area of innovation adoption. Outstanding farmers are those who are recognized for their above-average management abilities.

It is common knowledge that the farmer who adopts a successful new method or machine shortly after it becomes economically and technically feasible has profited, while the farmer who hesitates profits little because prices are usually adjusted to the lower costs of the improved method by the time the method has gained the consent of the farm population.

The objective will be to analyze the farm business operations of the forty-two outstanding farmers in the light of this predetermined, common knowledge in an attempt to establish characteristics and differences among this group, and also to search for implications which can provide some broad insights into the degree of inefficiency both locally and nationally which lies within the area of farmer acceptance of new agricultural production innovations.

#### OBJECTIVES OF THIS STUDY

The objectives of this study were to:

1. Analyze the characteristics of the outstanding farmers who were separated into three innovation categories on the basis of the degree of rapidity of their acceptance of farm production innovations.
2. Establish essential differences among the groups in the areas of:
  - a. Personal physical and mental qualities
  - b. Size of business operation in terms of acres and the various ramifications therein
  - c. Relative success derived from the practices used on the resource land
  - d. Size of business operation in terms of animal units possessed and the apparent differences resulting from the degrees toward which the animal unit resources are utilized
  - e. Incomes received from various predetermined sources and personal opinions as to amounts of income needed for family living and personal satisfaction

- f. Amounts and relative proportions of dollars contributing to the equity of the farm business
  - g. Judgments as to the factors contributing to the individual's success in the chosen occupation of farming
  - h. Labor necessities and relative proportions necessary for the operation of the farm business
  - i. Desires and anticipations for the future organization of their farm business
  - j. Opinions as to the future of agriculture and the controversial issues which are destined to be a vital integral in tomorrow's agriculture
3. Provide insights into the complete business structure of today's successful farmer and pinpoint tangible reasons for his apparent success.
  4. Establish the significance of the degree of competition and associated activities among the outstanding farmers of today and the implications this competition provides in assessing agricultural production practices in the future.
  5. Reveal apparent inefficiencies within the area of farmer acceptance of innovations and the establishment of significant values to be used in assessing the relative national importance of these particular inefficiencies now and in the future.

#### LOCALE OF STUDY

The study was conducted in Rice county which is located in the south central area of Kansas. The county consists of approximately 461,000 acres and is agriculturally devoted to cash crop and livestock production. Wheat, grain sorghum, forage sorghum and alfalfa are the primary field crops while beef cattle and hog production dominate the livestock enterprises.<sup>5</sup>

At the inauguration of the Rural Economic Development project, the eleven counties were individually analyzed in comparison to the mean average of the south central Kansas area on the basis of the following criteria:<sup>6</sup>

1. Livestock sold as a percent of all farm products sold in the county

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<sup>5</sup>Rice County Agricultural Extension Annual Report. Unpublished report, County Agricultural Extension office, Lyons, Kansas, 1960.

<sup>6</sup>Rural Economic Development material. Unpublished criteria, Kansas State University, Manhattan, Kansas, 1960.



2. Percent of county acreage in wheat
3. Percent of county acreage in corn
4. Farm income deviation from the mean
5. Percent of males over fourteen employed in agriculture
6. Percent of persons employed in manufacturing
7. Percent of increase in population in towns under 1,000
8. Level of living index
9. Population density per square mile
10. Dairy products sold as a percent of total county agricultural products

The counties that were within ten percent plus or minus of the mean of each category were considered representative of the area within each category. Based upon this set of criteria, Rice county was rated as being one of the two most representative counties illustrating the average type of conditions characteristic of the south central Kansas area. Figure 1 indicates the geographical location of Rice county and the south central Kansas area.

#### SOURCES OF INFORMATION

The information utilized for this study was obtained from the outstanding farmer questionnaire taken by the Kansas State University Rural Economic Development project during the spring of 1960. Approximately twenty professional, University and Extension personnel worked one week obtaining the necessary data.

In addition to receiving the pertinent data requested on the questionnaire, the farmer was also asked to relinquish a power of attorney for the Rural Economic Development project leader to obtain the farmer's state income tax returns for the years 1955-1959. Thirty-four of the forty-two outstanding



farmers consented to this request. The state income tax returns were utilized for studying all segments surrounding the areas of income and business expenditures.

An agricultural production questionnaire which was designed to inventory the farmers' possession of modern machinery and methods in the areas of crop and livestock production was utilized in addition to the previously mentioned sources.

Sample copies of the three previously mentioned tools used in gathering the raw data are included in Appendix A.

#### CRITERIA AND METHODS USED IN THE SELECTION OF THE RICE COUNTY OUTSTANDING FARMERS

A formal meeting was held in the early spring of 1960 with representatives from all segments of the Rice county economy in attendance. This group included members of the local chambers of commerce, the Rice County Agricultural Extension council, Agricultural Stabilization committee, and all other business or agricultural-related organizations and agencies.

Those in attendance were asked to vote on farmers with whom they were acquainted who had made outstanding progress in farming (the culture of crops, raising livestock and managing the farm business) and measured up closely with the following criteria:<sup>7</sup>

1. They use good management methods.
2. Use the latest proven methods in farming and are always right in their choices, at least the majority of the time.
3. Their neighbors observe their farming methods and learn better farming methods from them.

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<sup>7</sup>Rural Economic Development material. Unpublished criteria, Kansas State University, Manhattan, Kansas, 1959.

4. They have achieved one of the better types of farm organization for the area.
5. They have not subsidized their farming and development with oil income or other types of off-farm income.
6. They rate high for their farming and management abilities and not necessarily for their community activities and memberships in organizations.
7. They have achieved a standard of living that is a goal of the average farmer.
8. They are under 60 years of age.

The votes were then tallied, modified, and reduced to forty-two from which the study then originated.

#### ASSUMPTIONS AND TERMINOLOGY

The terminology, assumptions and overall analysis of this thesis are geared primarily to the processes and implications surrounding the acceptance of innovations by farmers. This study is primarily interested in analyzing the issues following the discovery of the innovation, not the variables surrounding the invention of the innovation. The inventor finishes his creative act, and the innovator or acceptor begins with it. The problems of innovation and acceptance are distinct and have different determinants so it is necessary that we fully qualify and recognize this distinction.<sup>8</sup>

Innovator. Farmers within this category are individuals who are known as "early adopters" to sociologists and economists. To the laymen this individual is known for his progressive attitude toward new farm production practices. He is the individual who is alert to all new practices which appear rational and economically sound. He is not the farmer who tries every practice or product on the market regardless of its practicability. These farmers are the first to use practices which are in the late stages of being proven or have

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8H. G. Barnett, The Basis of Cultural Change, pp. 332-333.

recently been proven by agricultural research institutions. These individuals employ considerable originality, intelligence and imagination concerning innovations which appear feasible in the future.

Limitational Innovator. Farmers included within this area are "majority adopters" in the sociologist's and economist's terminology. These individuals are not as advanced in their interest about new farm production innovations as the innovator class, but they do employ farm production practices which have been proven successful for relatively long periods of time. This group must be absolutely sure an idea will work before they adopt it. These farmers are just beginning to emerge from the 15-20-year-old fertilizer-crop production area of farm production practices and are contemplating the practicability of mechanized feeding, artificial roughage and grain drying systems. The innovator group are already actively engaged in the use of these modern farm practices at the present time. These individuals are interested in innovations but they do not employ the quality of originality, intelligence and imagination as possessed by the innovator.

Non Innovator. These individuals are known as "late adopters" to the sociologist and economist. These are farmers who possess a limited amount of innovations which have been proven successful over long periods of time. This group is presently in the 25-30-year-old crop rotation phase of production practices. Farmers within this category are limited in their ideas and opinions concerning innovations and do not show the quality of interest and enthusiasm that the innovator or limitational innovator possess. These individuals may or may not be opposed to innovations in farm production practices.

Innovation. This refers to all the physical concepts of biological and mechanical methods and equipment in the production of agricultural commodities. The term biological refers to those which have a physiological effect in increasing the total output (per acre, animal, unit of feed) from a given land base. The term mechanical refers to innovations as a machine which substitutes capital for labor but does not change the physiological outcome of the plants or animals to which it may apply.<sup>9</sup>

Innovation is not synonymous with invention. The making of the invention and the carrying out of the corresponding innovation are economically and sociologically two entirely different things.<sup>10</sup>

Acceptance. It is defined in this study to include both the approval of a practice as well as its adoption.

General Farmer. This includes all Rice county farmers who were selected in the Rice County Rural Economic Development survey on the basis of a random sample. Included within the sample are farmers with a wide range of resources, interests and capabilities. The cumulative average of these farmers on items measured is considerably lower than the average of the outstanding farmer population.

#### SEPARATION PROCEDURE

The criteria used in categorizing the adopters of new agricultural practices involved: (1) acceptance and approval of the theory and principle and (2) actual adoption of the method or practice.

To accomplish the set objectives two methods were used to analytically

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<sup>9</sup>Earl O. Heady, Economics of Agricultural Production and Resource Use, pp. 818-819.

<sup>10</sup>Carolyn Shaw Solo, "Innovation in the Capitalistic Process, A Critique of the Schumpeterian Theory," Quarterly Journal of Economics, August, 1951, 65:419.

separate the forty-two outstanding farmers into innovator, limitational innovator and non innovator categories.

The first method involved the use of eight questions which provided a comprehensive view of the farmer's present possession of farm production innovations, his plans for the future, and his personal judgments as to what the future holds for Rice county agriculture. It is assumed that the true innovator will not only possess modern farm production innovations, but he will also be able to provide intelligent assumptions as to innovations which appear feasible for the future. This individual is always thinking and possesses a curious and receptive attitude toward innovations which are continually being provided by the agricultural scientist.

In order to more fully explain the separation process, the following eight questions were analyzed. The numerical factor preceding each question is the relative merit or degree of importance applied to the question.

1. 3 - What recent innovations or changes have you recently adopted and what have been their effects?
2. 2 - What innovations or changes will you make next and what effects do you hope for?
3. 1 - What innovations or changes do you think farmers will adopt in the next five to ten years?
4. 1 - Have you over time used more and better machinery?
5. 1 - Would you like to purchase more machinery? (Above replacing present machinery as they wear out.)
6. 1 - Considering the difficulties, what purchases (above replacement) do you expect to make by 1970?
7. 5 - How do you believe agriculture might change in this area in the next five to ten years?

8. .5 - How do you believe agriculture might change in this area in the next 25 to 30 years?

Each question was individually analyzed and graded on the basis of a simple index (+1, 0, -1). The plus one (+1) index number represents innovations which have come upon the Kansas farm scene during the past five to seven years and are continuing to demonstrate their economical capabilities (feed wagons, roll-away nests, farrowing crates, etc.). The zero (0) index number represents farming practices which can no longer be classified as true innovations because their practicability has been tested and proven to be satisfactory under all types of conditions. (Hybrid varieties of field crops, fertilizer, contour farming, balanced rations, improved farm buildings, etc.) The minus one (-1) index number was used if the farmer did not answer the question or answered it by indicating that very little improvement can be expected or that he had no idea as to what the future held for him or for agriculture in general.

In some of the other open-ended types of questions concerning the future of agriculture, broad, descriptive replies such as more specialization, more mechanization, more integration, etc. were given a zero rating. It is believed that the true innovator would supply broad, descriptive generalizations but would also voluntarily provide specific examples of each of these proposed changes. The innovator has been exposed to these publicly stressed concepts such as more specialization, but he has personally analyzed what this means to his particular type of operation. Does specialization mean raising only one type of field crop or does it mean making more economical use of resources by raising field crops and marketing these crops through livestock? The true innovator has the answer to this dilemma.



On the yes and no type of questions a +1 grade was given to the yes answers, a -1 grade to the no answers and a 0 grade to unanswered questions.

On the question concerning the purchase of more machinery above replacement, a +1 grade was given to answers which indicated originality and practicality as to new types of machinery, a 0 grade to innovations which indicated the use of more conventional types of machinery and a -1 grade to unanswered questions.

After each farmer was graded by either a plus one (+1), zero (0) or a minus one (-1), the index was multiplied by the relative importance of the question for the final grade on the particular question. Each question was graded in this fashion with the maximum cumulative final grade being 10.

The second method included the use of an agricultural production questionnaire which was designed to inventory the farmer's possession of modern field crop machinery, field crop production practices, livestock feeding equipment, livestock feeding facilities, grain and roughage harvesting equipment, and grain and roughage storage practices.

Relative numerical values were awarded to each piece of equipment, facility or practice primarily on the basis of the time in which the innovation came into existence and its economic soundness in terms of the resource capabilities of the area.<sup>11</sup>

The questionnaires were individually totaled and recorded with the highest individual score being 9.0.

The eight question analysis and agricultural production questionnaire were combined for the final total cumulative score. The eight question analysis had a maximum value of 10.0 and the agricultural production questionnaire a

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<sup>11</sup>A copy of the factors and procedures used in scoring the Farm Production questionnaire is included in Appendix B.

maximum score of 9.0. This process indicates a 53% influence exerted on the part of the eight question analysis and a 47% influence in favor of the agricultural production questionnaire. A higher relative value was awarded to the eight question analysis because the wide variety of questions provided excellent insight into the individual's originality and imagination which is fundamental in the continued adoption of new production practices.

The two previously mentioned methods combined satisfactorily in revealing the exceptions to the rule. For example, if the individual did not completely cooperate in providing the quality of answer desired, but did actually possess a number of innovations an allowance was awarded. There are numerous variables surrounding each of the two separational processes employed, but it is felt that the two do satisfactorily serve the purpose of curtailing the magnitude of exceptions which are necessary in conducting the study at this particular level of significance.

#### METHODS OF ANALYSIS

The analysis in this study employed the statistical method rather than the case study method. The sampling process which has been previously described was undertaken in a selective manner by various civic, social, agricultural and business-orientated individuals and agencies located within Rice county.

The statistical procedures and analyses used involved a representative sample of the outstanding farmers located in the south central Kansas area. The statistically significant conclusions could apply to similar circumstances occurring in every county located in the general study area.

The arithmetic mean referred to as the average within this thesis was used to measure the central tendency of the characteristics and circumstances

which were tested to determine significant differences among the three innovation groups of farmers.

The statistical tests were used in an effort to determine what significant differences and relationships occurred within the analysis. The levels of probability used in the tests were .05 and .10.

The statistical tests included: Mann - Whitney T-test;<sup>12</sup> analysis of variance with the usual statistical F-test;<sup>13</sup> Kolmogorov - Smirnov deviation test;<sup>14</sup> Spearman rank correlation test;<sup>15</sup> and Chi-Square test of independence.<sup>16</sup>

#### CHRONOLOGICAL AND EDUCATIONAL CHARACTERISTICS

The statistical methods employed in the analysis of this section were the analysis of variance and the F-test of significance. The levels of probability were .05 and .10 in all cases. All future reference to the test of significance and the F-value will surround this standardized testing procedure.

#### Average Age of Participants

The average age of the three classes of farmers indicated the innovators, limitational innovators and non innovators to be 41.05, 43.26 and 48.00 years of age respectively.

The three groups were tested for a significant difference with the resulting F-value of 1.98 being nonsignificant (Table 1). The limitational

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<sup>12</sup>George W. Snedecor, Statistical Methods, p. 118.

<sup>13</sup>Ibid., pp. 246-249.

<sup>14</sup>Sidney Siegel, Non Parametric Statistics for the Behavioral Sciences, p. 284.

<sup>15</sup>Snedecor, op. cit., pp. 190-192.

<sup>16</sup>Ibid., p. 18.

and non innovators were then combined and tested against the innovator class. An F-value of 2.24 was received which was also nonsignificant (Table 2). Both tests indicated a nonsignificant difference, so statistically it could be concluded that the average age of the three classes of farmers does not differ.

#### Average Years of Formal Education Completed

The average years of formal education completed by the head of the household indicated that the innovators had completed 14.00 years of schooling, the limitational innovators 13.46 years and the non innovators 13.00 years.

The three groups were tested with the resulting F-value of 1.24 being nonsignificant (Table 1). The limitational and non innovators were again combined and tested against the innovator class with the resulting F-value of 2.10 also nonsignificant (Table 2). Both tests again yielded no significant differences so it can be statistically concluded that the average years of formal education completed by the heads of the households of the three innovation categories do not differ.

#### Experience in the Farming Profession

In calculating the average number of years the farmer has been farming it was found that the innovator has been farming an average of 17.15 years, the limitational innovator 19.86 years and the non innovator 26.57 years.

The statistical test of significance among the three groups yielded an F-value of 2.34 which was nonsignificant (Table 1). The limitational and non innovators were again combined and tested against the innovator group with the resulting F-value of 2.44 also being nonsignificant (Table 2).

Table 1. Summary of the analysis of variance and F-test of significance for selected chronological and educational characteristics by innovation categories.

Item	Limitational:			Significance
	Innovator:	Innovator	Non Innovator:	
	Average	Average	Average	
Average age of farmers	41.05	43.26	48.00	ns
Average years of formal education completed by head of household	14.00	13.46	13.00	ns
Length of farm tenure	17.15	19.86	26.57	ns

ns - nonsignificant at the .05 and .10 levels of probability

Table 2. Summary of the analysis of variance and F-test of significance for selected chronological and educational characteristics by reduced innovation categories.

Item	Limitational and		Significance
	Innovator	Non Innovator	
	Average	Average	
Average age of farmers	41.05	44.77	ns
Average years of formal education completed by head of household	14.00	13.31	ns
Length of farm tenure	17.15	22.00	ns

ns - nonsignificant at the .05 and .10 levels of probability

#### Review and Conclusions

The average age analysis indicates that the innovators are approximately two years younger than the limitational innovators and an average of seven years younger than the non innovator category. As a matter of comparison, the average age of farmers interviewed in Kansas during the last census was 48.6

years which is closely related to the non innovator category in this study.<sup>17</sup>

The average age breakdown in this analysis, although not statistically significant, is in agreement with the findings of the Interstate Managerial Survey and the Beal and Bohlen sociological studies which have concluded that the younger aged farmers tend to be innovators.<sup>18</sup>

In the area of formal education for the head of the household, the overall high quality and caliber of farmers included within this study revealed no statistical differences. The innovators who averaged 14 years of formal education surpassed the limitational innovator group by one-half year and the non innovator group by only one year. The range of all the farmers included within the study was from 11 to 17 years with the years 14 and 16 occurring most frequently.

The indications from this analysis although not statistically proven imply that the innovators tend to achieve higher formal education status. This implication is also in agreement with the findings of the Interstate Managerial Study and the Beal and Bohlen sociological studies.<sup>19</sup>

In the area of farm tenure or length of time which the farmer has been farming on his own, the innovators again tended to be the youngest of the three classes. The innovators, who averaged 17 years of farm tenure, were three years less experienced than the limitational innovators and ten years shorter on farm experience than the non innovators.

Again, the statistical test revealed no statistical differences, but the implications from this analysis support the Interstate Managerial Survey

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<sup>17</sup>United States Census of Agriculture 1954, Volume 1, Part 13, United States Department of Commerce, p. 16.

<sup>18</sup>Peter E. Hildebrand and Earl J. Partenheimer, "Socioeconomic Characteristics of Innovators," Journal of Farm Economics, May 1958, 40:447.

<sup>19</sup>Loc. cit.

and the Beal and Bohlen sociological studies which have revealed that those farmers who have farmed less than 20 years are more likely to be innovators than those who have farmed 21-40 years.<sup>20</sup>

#### FARM TYPES AND TENURE STATUS

In studying the type of farm which each of the farmer's possessed when he began in the profession of farming approximately 20 to 30 years ago, there was found a relatively equal distribution among cash crop, cash crop - cow herd, cash crop - beef feeding and a general type of farming system. One-third of the innovators were on a cash crop program, with the remainder equally participating in the five remaining programs. The limitational innovators also had 33% participating in a cash crop program, 27% in cash crop - cow herd, and 27% in cash crop - cow herd - beef feeding. The non innovators also concentrated the majority of their interests in cash crop - cow herd and the cash crop - cow herd - beef feeding systems.

Table 3. Average type of farm at the beginning of their farming career by innovation categories.

Farm Type	: Innovator :		: Limitational :		: Non Innovator :	
	No. of Farms	% of Total	No. of Farms	% of Total	No. of Farms	% of Total
Cash crop	7	35.0	5	33.0	1	14.0
Cash crop - cow herd	3	15.0	4	27.0	2	28.0
Cash crop - beef feeding	2	10.0	1	6.5		
Cash crop-cow herd-beef feeding	3	15.0	4	27.0	3	44.0
Cow herd	2	10.0	1	6.5		
General farm*	3	15.0			1	14.0
Total	20	100.0	15	100.0	7	100.0

\* - includes a completely diversified farm with no well defined program

<sup>20</sup>Loc. cit.

Table 4 indicates that the innovators have completely abandoned the cash crop and general farm arrangements and have concentrated the majority of their efforts on cash crops with a supporting beef or hog program. Approximately 75% of the limitational innovators have adopted a cash crop - livestock feeding system, however 25% still manage a cash crop or general type farm. Twenty-nine percent of the non innovators still manage a cash crop system with the remainder adopting a complementary livestock system with their existing cash crop program.

Table 4. Average type of farm the farmers have now by innovation categories.

Farm Type	: Innovator :		: Limitational :		: Non Innovator :	
	: No. of :	: % of :	: No. of :	: % of :	: No. of :	: % of :
	Farms :	Total :	Farms :	Total :	Farms :	Total :
Cash crop			3	20.0	2	29.0
Cash crop - cow herd	3	15.0	3	20.0	1	14.0
Cash crop - cow herd - sows	3	15.0	1	7.0		
Cash crop - deferred steers - heifers	8	40.0	4	27.0	1	14.0
Cash crop - dairy	2	10.0	1	6.5		
Cash crop - sows	4	20.0				
Cash crop - dairy - sows			1	6.5		
Cash crop - beef feeding - sows			1	6.5	3	43.0
General*			1	6.5		
Total	20	100.0	15	100.0	7	100.0

\* - includes a completely diversified farm with no well defined program

#### Temure Status

In analyzing the temure status of the three groups of farmers, the study showed a well-defined and consistent apportionment taking place.

Seventy-five percent of the innovators, 67% of the limitational innovators and 86% of the non innovators are renters. The remaining percentages are part owners with the exception of the innovators who had the only full owner in the study.



Table 5. Average present temure status by innovation categories.

Temure Status	: Innovator :		: Limitational :		: Non Innovator :	
	No. of:	% of:	No. of:	% of:	No. of:	% of:
	farms	total:	farms	total:	farms	total:
Renter	15	75.0	10	67.0	6	86.0
Part owner	4	20.0	5	33.0	1	14.0
Full owner	1	5.0				
Total	20	100.0	15	100.0	7	100.0

### Review and Conclusions

Analysis of the changes in types of farms during the past thirty years, indicated that the innovator group made the greatest amount of complete changes and adopted a more concise, homogeneous farming program. The innovators completely abandoned the cash crop and general type of farms for a cash crop - beef, swine or dairy livestock option. Deferred steers and hoifers and swine were the predominant complementary livestock systems employed.

The majority of the limitational and non innovators supplemented their existing programs with a wide range of livestock enterprises. Deferred steers and heifers, beef cow herd and swine were the predominant livestock enterprises. Approximately 25% of the limitational innovators and 30% of the non innovators still manage a cash crop or general type of farm.

It can be concluded from this analysis that the innovators as a group have realized the importance of an adequate livestock program to utilize their home-grown feed more rapidly than the limitational and non innovators.

Temure status did not indicate any significant differences among the three groups of farmers analyzed. Seventy-five percent of the innovators,

67% of the limitational innovators and 86% of the non innovators were renters or tenants. The remaining percentages of the three groups were part-owners with the exception of the innovators who had one full-owner.

Based upon the circumstances surrounding this analysis there appears to be no significant difference in the temure status among the innovator, limitational innovator and non innovator categories.

As a means of comparison with the average temure status of all farms in Kansas, the Kansas Agricultural Census reports 25% of all the farms in Kansas in 1954 were tenants, 33% part owners, 27% full owners and 15% other.<sup>21</sup>

The trend appears to be away from land ownership by the group of outstanding farmers under study as opposed to the relatively high percentage of land ownership reported by the state census.

#### LAND RESOURCES

The statistical method employed in analyzing all the land resources was the analysis of variance and the characteristic F-test. The levels of probability were .05 and .10 in all cases. All future references to the test of significance and the resulting F-value will apply to this standardized testing procedure.

#### Cropland

Cropland Owned. In analyzing the 1959 acreages of cropland owned it was found that the innovator owned an average of 284 acres, the limitational innovator 292 acres and the non innovator 197 acres.

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<sup>21</sup>United States Census of Agriculture, p. 10.

In testing for significant differences among the three groups of farmers an F-value of .144 was received which was nonsignificant (Table 6). The limitational and non innovators were then combined and tested against the innovator group. An F-value of .032 was received which was also nonsignificant (Table 7).

Cropland Rented. The 1959 average acres of cropland rented showed the innovator farming an average of 471 acres, the limitational innovator 736 acres, and the non innovator 356 acres.

The three groups were tested for significant differences which resulted in a significant F-value of 2.45 (Table 6). The combined limitational and non innovators were then tested against the innovator group with the resulting F-value of 1.09 being nonsignificant (Table 7).

Average Total Cropland Managed. In combining the average total cropland owned and rented it was observed that the innovators managed an average of 755 acres of cropland, the limitational innovators 1,028 acres and the non innovators 553 acres.

The three groups were tested with the resulting F-value of 1.88 being nonsignificant (Table 6). Again the limitational and non innovators were combined and tested against the innovator group. This test produced an F-value of .451 which was nonsignificant (Table 7).

Anticipations as to the Average Acres of Cropland They Will Own by 1970. The innovators do not expect to purchase any additional acres of cropland, the limitational innovators expect to purchase 135 acres and the non innovators approximately 25 acres of cropland.

The three groups of farmers were tested with the resulting F-value of .867 being nonsignificant (Table 6). The test of significance between the

combined limitational and non innovator group and the innovator group yielded a nonsignificant F-value of .396 (Table 7).

Opinions About the Amount of Cropland Which Should be Retired to Grass.

In estimating the amount of cropland which should be retired to grass, it was found that the innovators critically analyzed the quality of their cropland to a greater extent than the other two innovation categories. The innovators felt that an average of approximately 230 acres of cropland should be retired to grass while the limitational and non innovators estimated that 64 and 51 acres respectively were of poor enough quality to warrant retiring to grass.

The single test of significance among the three groups and the combined limitational-non innovator test were run with resulting nonsignificant F-values of .767 and 1.57 (Tables 6 and 7).

Table 6. Summary of the analysis of variance and F-test of significance for selected cropland characteristics by innovation categories - 1959.

Item	: Limitational :			: Significance
	: Innovator	: Innovator	: Non Innovator:	
	:Average acres:	Average acres:	Average acres:	
Average cropland owned	284	292	197	ns
Average cropland rented	471	736	356	*
Average total cropland managed	755	1028	553	ns
Average acres cropland they expect to own by 1970	284	427	222	ns
Average acres cropland which should be retired to grass	230	64	51	ns

\* - significant at the .10 level of probability  
 ns - nonsignificant at the .05 and .10 levels of probability

Table 7. Summary of the analysis of variance and F-test of significance for selected cropland characteristics by reduced innovation categories - 1959.

Item	: Innovator	: Limitational & Non Innovator	Significance
	: Average acres	: Average acres	
Average cropland owned	284	262	ns
Average cropland rented	471	615	ns
Average total cropland managed	755	877	ns
Average acres cropland they expect to own in 1970	284	361	ns
Average acres cropland which should be retired to grass	230	61	ns

ns - nonsignificant at the .05 and .10 levels of probability

Review and Conclusions. The cropland analyses provide some important insight into the amount of cropland currently being utilized by the three innovation categories.

The limitational innovators managed an average of 1,028 acres which is 273 more acres than the innovators and 475 more than the non innovators. The primary difference lies in the amount of cropland rented. The limitational innovator rents an average of 736 acres which is 261 more acres than the innovator and 475 more than the non innovator.

The amount of cropland owned follows relatively the same order as the rented section with the innovator and limitational innovator owning approximately 290 acres of land and the non innovator approximately 200 acres.

In estimating the amount of cropland they will own in 1970, it was found that the innovators did not plan to purchase any additional cropland while

the limitational and non innovators plan to purchase 135 and 25 acres respectively.

The innovator estimated that an average of 230 acres should be retired to grass as compared to 64 acres for the limitational innovator and 51 acre for the non innovator.

It appears that crop production is much more of an integral part of the limitational innovator's farming business than the innovator or non innovator. The limitational innovator manages more cropland and undoubtedly concentrates the majority of his efforts in the production of grains and roughages. It is also apparent that the limitational and non innovator will be purchasing a considerably greater amount of cropland during the next ten years than the innovator.

It was found that the innovator possesses a more critical attitude in evaluating the productive capabilities of his particular soile. It is impossible to generalize and completely hypothesize that this critical attitude applies to all evaluations of the innovator concerning his particular possessions, but on the basis of this single observation it appears that he possesses a more critical evaluatory disposition than the limitational and non innovator.

#### Pastureland

Pastureland Owned. In analyzing the total acres of pastureland owned it was discovered that the innovator possessed an average of 179 acres, the limitational innovator 62 acres and the non innovator 43 acres.

The three groups were tested for significant differences with the resulting F-value of .463 being nonsignificant (Table 8). The limitational and non innovator group were also combined and tested against the innovator group with a resulting nonsignificant F-value of .946 (Table 9).

Pastureland Rented. The analysis of the average total amount of pastureland rented indicated that the innovators rent an average of 186 acres, the limitational innovators 123 acres and the non innovators 80 acres of pastureland.

The three groups were then tested for significant differences which yielded an F-value of .930 which was nonsignificant (Table 8). In combining the limitational and non innovators for a test against the innovators, the resulting F-value of 1.65 was nonsignificant (Table 9).

Average Total Pastureland Managed. The average total pastureland owned and rented were combined and it was found that the innovators manage an average of 365 acres of pasture, the limitational innovators 185 and the non innovators 123. The test of significance among the three groups produced an F-value of 1.21 which was nonsignificant (Table 8). The statistical test between the combined limitational and non innovators and the innovators also produced a nonsignificant 2.39 F-value (Table 9).

Anticipations as to the Average Acres of Pastureland They Expect to Own by 1970. The anticipation of purchasing more pastureland during the 1960's did not interest any of the innovation categories significantly. The innovator group indicated that they desired to reduce their owned pasture acres by 116 acres while the limitational and non innovators anticipated increasing their acreages by four and ten acres respectively.

The test of significance among the three groups yielded an F-value of .118 which was nonsignificant (Table 8). The analysis of the combined limitational and non innovators against the innovators also yielded a nonsignificant F-value of .263 (Table 9).

Table 8. Summary of the analysis of variance and F-test of significance for selected pastureland characteristics by innovation categories - 1959.

Item	: Limitational :			: Significance
	: Innovator	: Innovator	: Non Innovator:	
	: Average acres:	Average acres:	Average acres:	
Average pastureland owned	179	62	43	ns
Average pastureland rented	186	123	80	ns
Average pastureland managed	365	185	123	ns
Average acres pastureland they expect to own by 1970	63	66	53	ns

ns - nonsignificant at the .05 and .10 levels of probability

Table 9. Summary of the analysis of variance and F-test of significance for selected pastureland characteristics by reduced innovation categories - 1959.

Item	: Limitational & :		: Significance
	: Innovator	: Non Innovator	
	: Average acres	: Average acres	
Average pastureland owned	179	57	ns
Average pastureland rented	186	112	ns
Average pastureland managed	365	169	ns
Average acres pastureland they expect to own by 1970	63	61	ns

ns - nonsignificant at the .05 and .10 levels of probability



### Cropland and Pastureland

By combining the average total amount of cropland and pastureland (owned and rented) which the farmers manage it was found that some interesting trends had taken shape. The limitational innovator consistently managed a larger amount of owned and rented land from 1940 through 1960 and if his anticipations for 1970 hold true, he will also be managing a larger sized land unit in 1970. Table 10 indicates the trends in the average accumulations of owned land through the preceding two decades and one decade into the future. It is interesting to note that the innovators purchased a relatively higher average amount of land than the limitational innovator during the period 1950-1960, but in estimating the future the innovators are reluctant to invest more money in land while the limitational and non innovators anticipate purchasing more land but at a somewhat reduced rate than they have in the past.

Table 11 again indicates that the limitational innovator has consistently rented more land than the innovator and non innovator. The anticipation for renting more land in the future also indicates that the limitational innovator is more land conscious than the other two categories.

Table 12 illustrates the trend in the total land managed by innovation categories. The limitational innovators have managed approximately 100 more acres than the innovators, and if their future plans hold true they will be managing approximately 300 more acres than the innovators in 1970. It should be noted that the limitational innovator is considerably more interested in managing more land than the innovator or non innovator, and his interest lies equally in the owning and renting methods of acquiring more land.

Table 10. Trends in expansion of average total owned land by innovation categories - 1940-1970.

Farm Classification	Average : : acres	Average : : acres	Average : : acres	Average : : acres
	1940	1950	1960	1970
Innovator	85	167	463	347
Limitational Innovator	40	303	354	493
Non Innovator	40	151	240	250

Table 11. Trends in expansion of average total rented land by innovation categories - 1940-1970.

Farm Classification	Average : : acres	Average : : acres	Average : : acres	Average : : acres
	1940	1950	1960	1970
Innovator	300	554	657	760
Limitational Innovator	463	728	859	924
Non Innovator	276	383	436	455

Table 12. Trends in expansion of average total land managed by innovation categories - 1940-1970.

Farm Classification	Average : : acres	Average : : acres	Average : : acres	Average : : acres
	1940	1950	1960	1970
Innovator	385	721	1120	1107
Limitational Innovator	503	1031	1213	1417
Non Innovator	316	534	676	705

The study also analyzed the relative percentages of cropland and pasture-land encompassing the total volume of land managed by the innovation categories, and investigated the differences in the composition of the owned and rented sections now and in the future.

The owned land section indicates that cropland has consistently occupied 80-90% of the total land owned by the innovators with the exception of the period 1950-1960 when the innovator group increased its holdings of pastureland sufficiently to reduce the cropland percentage to 61%. The limitational and non innovators' holdings of owned cropland have encompassed approximately the same 80-90% proportion from 1940-1960. The predictions concerning the future indicate that the limitational innovator will stress more importance on owning cropland while the non innovator anticipates owning slightly more pastureland (Table 1 in Appendix C).

The rented land section illustrates the same type of distribution taking place among the three groups of farmers; the only difference being that the percentage of cropland occupying this section is reduced approximately 10% for the innovators and non innovators. A greater amount of pastureland is rented on the part of the innovators and non innovators while rented pastureland occupies approximately the same percentage distribution for the limitational innovator (Table 2 in Appendix C).

The combined total cropland owned versus total cropland rented indicates a constant trend on the part of all three innovation categories to continually increase their holdings of owned land. The limitational and non innovators have shown a continual increase from 1940 to 1970 in increasing their relative proportion of owned land, the innovator reached his peak in 1960 and has started to reduce his holdings of owned land. This decrease is due primarily to his plans for reducing his holdings of owned pastureland. (Table 3 in Appendix C)

In addition to analyzing the various proportions of owned and rented land possessed by each of the innovation categories, it is interesting to analyze

the differences in the critical appraisal characteristics of these three groups in regard to classifying their owned and rented pastureland into good, average and poor categories.

The innovator group which owns approximately three times as much pastureland as the limitational and non innovators estimates that only 11% of its pastureland is of good quality while the limitational and non innovators estimate that 66% and 72% of their acres of pastureland are of good quality (Table 13).

In appraising the rented pastureland, the three groups were much closer in their appraisal estimates. The innovators estimated that 78% of their rented pastureland was of good quality while the limitational and non innovators estimated that 74% and 45% of their rented pastureland was of good quality (Table 14).

Table 13. Appraisal of average pastureland owned by innovation categories.

Item	: Limitational :		
	: Innovator	: Innovator	: Non Innovator
	: % of total	: % of total	: % of total
Acres of good quality land	11	66	72
Acres of average quality land	75	32	28
Acres of poor quality land	14	2	0

Table 14. Appraisal of average pastureland rented by innovation categories.

Item	: Limitational :		
	: Innovator	: Innovator	: Non Innovator
	: % of total	: % of total	: % of total
Acres of good quality land	78	74	45
Acres of average quality land	17	20	15
Acres of poor quality land	5	6	40

The average carrying capacity of grazing animal units on the total pastureland managed indicates that in 1959 the non innovators averaged 2.6 acres per animal unit, the innovators 3.0 acres per animal unit and the limitational innovators 4.0 acres per animal unit. This evidence indicates that overpasturing on the part of the innovators does not appear to be the reason for their extremely critical appraisal of their owned pastureland.

Based upon the widespread geographic distribution of the three groups of farmers throughout the county and the analysis of the existing average carrying capacity practices, it can be concluded that the innovator group appears to be more critical in the evaluation of its owned pastureland. In the area of rented pastureland the three groups appear closer in their evaluation procedures.

It should be noted that the preceding hypothesis concerning the critical evaluatory disposition of the innovator group in analyzing cropland also held true in the appraisal of pastureland.

#### Review and Conclusions

The land analyses indicated that the limitational innovator was managing approximately 270 more acres of cropland than the innovator and 475 more acres than the non innovator. If the farmers' plans develop in a manner coherent with their anticipations the limitational innovator will be owning an average of 135 more acres of cropland by 1970 as compared to 25 more for the non innovator and none for the innovator.

The pastureland section shows the innovator presently manage approximately 180 more acres of pastureland than the limitational innovator and 240 more acres than the non innovator. If the farmers' plans for the future develop

according to their present wishes, this distribution will be reversed. The innovator indicates that he plans to reduce his holdings of owned pastureland by slightly over 100 acres while the limitational and non innovator plan to increase their holdings slightly.

As a final verification of the average figures indicating that the limitational and non innovators were interested in managing more land in the future the farmers were asked, Do you want to farm more land?. The yes and no answers were tabulated and a chi-square test of independence was employed to test for a significant difference in the ratio of yes to no replies by innovation categories.

Table 15. Chi-square test of independence of the desiree to farm more land by reduced innovation categories.

Item	: Innovator	: Limitational and Non Innovator
Desires to farm more land	10	13
Does not desire to farm more land	10	9
Total	20	22

$$\chi^2 = \sum \frac{(O - E)^2}{E} = .34 \quad \alpha = .05$$

O - observed frequency  
E - expected frequency

The  $\chi^2 = .34$  was nonsignificant at the .05 level of probability indicating that there was no statistical significant difference between the ratios of the two innovation categories concerning the desiree to farm more land. It was found, however, that 59% of the limitational and non innovators desired to farm more land while only 50% of the innovators were interested in more land.

It is concluded that the limitational innovator manages more land than the innovator or non innovator, and it appears that this trend will continue through the 1960's. The limitational and non innovators are land-conscious and obviously envision the production of more bushels of grain and tons of roughage as a necessary prerequisite for success in the future.

Sufficient evidence was also found to conclude that the innovator possesses a more critical evaluatory standard in appraising and evaluating his farm resources. This fact was proven in the cropland and pastureland sections where the farmers were asked to estimate the amount of cropland which should be retired to grass and the average acres of good, average and poor quality of owned pastureland.

#### CROP PRODUCTION PRACTICES

##### Current and Expected Future Yields

The four primary field crops grown in the area were tested for significant differences using the analysis of variance and F-test of significance. No significant differences were found concerning the average long-run yields which have been received and the farmers' anticipations for yields in the future.

The innovator group has received higher average yields in the production of continuous wheat, fallow wheat and forage sorghum while the non innovator has led in the production of grain sorghum. The same distribution holds true for average future yields expected with the innovator maintaining higher yields in the area of continuous wheat, fallow wheat and forage sorghum production while the non innovator is more optimistic concerning the future yields of grain sorghum.

The following tables illustrate the tests for significant differences between the average present yields and the anticipated future yields by innovation categories.

Table 16. Long-run average yields received by innovation categories.

Item	: Limitational:			: Significance
	: Innovator:	: Innovator:	: Non Innovator:	
	: Mean ave.:	: Mean ave.:	: Mean ave.:	
Grain sorghum (bu/acre)	38	39	46	ns
Forage sorghum (tons/acre)	12	11	12	ns
Continuous wheat (bu/acre)	23	21	22	ns
Fallow wheat (bu/acre)	32	27	28	ns

ns - nonsignificant at the .05 and .10 levels of probability

Table 17. Average future yields expected by innovation categories.

Item	: Limitational:			: Significance
	: Innovator:	: Innovator:	: Non Innovator:	
	: Mean ave.:	: Mean ave.:	: Mean ave.:	
Grain sorghum (bu/acre)	48	51	59	ns
Forage sorghum (tons/acre)	15	14	12	ns
Continuous wheat (bu/acre)	27	26	25	ns
Fallow wheat (bu/acre)	35	34	30	ns

ns - nonsignificant at the .05 and .10 levels of probability



Table 18. Difference in opinions between present yields and anticipated future yields by innovation categories.

Item	:Limitational:		
	:Innovator	:Innovator	: Non Innovator
Average grain sorghum yield (bu/acre)	38	39	46
Average expected grain sorghum yield (bu/acre)	48	51	59
Difference	10	12	13
Average forage sorghum yield (tons/acre)	12	11	12
Average expected forage sorghum yield (tons/acre)	15	14	12
Difference	3	3	0
Average cont. wheat yield (bu/acre)	23	21	22
Average expected cont. wheat yield (bu/acre)	27	26	25
Difference	4	5	3
Average fallow wheat yield (bu/acre)	32	27	28
Average expected fallow wheat yield (bu/acre)	35	34	30
Difference	3	7	2

The innovator and limitational innovator consistently anticipate larger increases in yields for the future in all areas of crop production except grain sorghum, where the non innovator anticipates a one to two bushel estimate over the innovator and limitational innovator. The limitational innovator ranks first followed by the innovator and non innovator in terms of overall optimism concerning the average future yields of the crops under consideration.

## Use of Strong Milling Varieties of Wheat

Wheat production in Kansas and throughout the United States has reached the point where the protein content has become an increasingly important consideration in the flour milling and baking industries, consequently the issue of planting strong milling varieties of wheat is another new crop production innovation currently being inaugurated by farmers in Kansas.

The farmers were divided into innovator and combined limitational and non innovator categories and tested for a significant difference between the ratio of the number of farmers who use strong milling varieties as opposed to those who do not. The Chi-square test of independence was employed with the level of probability being .05.

Table 19. Chi-square test of independence between farmers who plant strong milling varieties of wheat as opposed to those who do not.

Item	Innovator	Limitational & Non Innovator
Use	7	7
Do not use	11	14
Total	18	21

$$\chi^2 = \sum \frac{(O - E)^2}{E} = .12 \quad \alpha = .05$$

O - observed frequency

E - expected frequency

The foregoing test resulted in a  $\chi^2 = .12$  which was nonsignificant at the .05 level of probability. The Chi-square test of independence indicates that the ratio between those that utilize and those that do not utilize strong milling varieties of wheat does not differ between innovation categories. It

is interesting to note, however, that 39% of the innovators use strong milling varieties of wheat as compared to only 33% of the limitational and non innovators.

#### Fertilizer and Insecticide Use

The analysis of variance and the F-test of significance were employed in the search for significant differences among the three innovation categories concerning the use of commercial fertilizer and insecticides in field crops.

Fertilizer use was analyzed in the production of grain sorghum, forage sorghum, continuous wheat and summer fallow wheat. Commercial fertilizer costs were based upon .125 cents per unit for nitrogen, .09 cents per unit for phosphate and .06 cents per unit for potash.<sup>22</sup>

The insecticide use analysis was concerned with the total amount of money the farmer had spent for insecticides on all crops in 1959.

It was found that the non innovators spent a significantly greater amount of dollars for fertilizer on summer fallow wheat than the innovators or limitational innovators. It should also be noted that the innovators spent a significantly greater amount for fertilizer on grain sorghum than the combined limitational and non innovator group.

Tables 20 and 21 provide a more detailed analysis of the tests conducted.

Table 20. Analysis of variance and F-test of significance for the use of fertilizer and insecticides in crop production practices by innovation categories.

Item	: Innovator	: Limitational:	: Non Innovator:	Significance
	: Mean ave.	: Mean ave.	: Mean ave.	
Dollars/acre spent for fertilizer on grain sorghum	1.49	.82	.27	ns

<sup>22</sup>Rural Economic Development Crop Production Coefficients. Unpublished criteria, Kansas State University, Manhattan, Kansas, 1960.

Table 20. (concl.).

Item	: Limitational :			: Significance
	: Innovator	: Innovator	: Non Innovator	
	: Mean ave.	: Mean ave.	: Mean ave.	
Dollars/acre spent for fertilizer on forage sorghum	1.84	.80	0	ns
Dollars/acre spent for fertilizer on continuous wheat	3.70	3.24	3.12	ns
Dollars/acre spent for fertilizer on summer fallow wheat	.86	.22	2.37	*
Dollars/acre spent for the use of insecticides on all crops	60.00	53.00	29.00	ns

\* - significant at the .10 level of probability  
 ns - nonsignificant at the .05 and .10 levels of probability

Table 21. Analysis of variance and F-test of significance for the use of fertilizer and insecticides in crop production practices by reduced innovation categories.

Item	: Limitational and :		: Significance
	: Innovator	: Non Innovator	
	: Mean ave.	: Mean ave.	
Dollars/acre spent for fertilizer on grain sorghum	1.49	.64	*
Dollars/acre spent for fertilizer on forage sorghum	1.84	.62	ns
Dollars/acre spent for fertilizer on continuous wheat	3.70	3.20	ns
Dollars/acre spent for fertilizer on fallow wheat	.86	.79	ns
Dollars/acre spent for the use of insecticides on all crops	60.00	46.00	ns

\* - significant at the .10 level of probability  
 ns - nonsignificant at the .05 and .10 levels of probability

## Review and Conclusions

The average yields received from the production of the four most important field crops in south central Kansas do not differ among the three innovation categories.

The innovator consistently received a higher average yield per acre in the production of continuous wheat and fallow wheat over the limitational and non innovator categories. The differences in the yields of continuous wheat can be explained by the use of more fertilizer on the part of the innovator while the results from fallow wheat, grain sorghum and forage sorghum do not follow this trend.

It can be concluded from the results of this study that the use of fertilizer does not directly correlate with increased yields. There are a number of other cultural practices not measured in this analysis which could account for the resulting differences in yields. It appears that the innovator administers a superior quality of workmanship over the limitational and non innovator categories in the overall area of crop production.

The inconsistency in the results received from the production of grain sorghum cannot be explained. The non innovator group has undoubtedly taken considerable interest in this particular crop and will continue to increase the production of this crop by a considerably larger margin than the other three remaining crops found in this area. Since the introduction of hybrid grain sorghum in the early 1950's this crop has demonstrated enormous increases in yields over the standard open-pollinated varieties. This innovation is still new enough that farmers are continuing to anticipate larger increases in yields than the other three crops commonly raised in the area.

The innovator has utilized more fertilizer on continuous wheat, grain sorghum and forage sorghum while the non innovator has spent considerably more for fertilizer on fallow wheat.

The innovator also used more insecticide during 1959 than the limitational and non innovator.

Attention should be drawn to the fact that the innovators and limitational innovators are on the average more optimistic concerning future increases in yields of three of the four primary field crops raised in the area. This optimism illustrates the interest, ambition and imagination that these highly innovative groups possess concerning the future trends in food production in this country.

In the area of adopting stronger milling varieties of wheat, 39% of the innovators use the higher milling varieties while only 33% of the limitational and non innovators have accepted this innovation.

The following table compares field crop production of the innovation categories with other groups of farmers located in south central Kansas.

Table 22. Average crop production practices - 1959.

Item	: :Innovator	: Limitational & : Non Innovator	:General: :Farmer	: Farm Mgt. : Assn. No. 2
Ave. cont. wheat yield (bu/acre)	23	21	22	23
Ave. grain sorghum yield (bu/acre)	38	41	39	40
Ave. silage yield (tons/acre)	12	12	11	9

The foregoing table illustrates the nonsignificant differences among the four groups of farmers in the area of crop production for 1959. It is realized

that 1959 was an exceptional crop production year for the particular area studied and that more data extending over a considerably longer time span is necessary before valid conclusions can be drawn regarding the crop producing abilities of the farmers.

### LIVESTOCK

The analysis of the existing livestock programs was approached primarily on the basis of the total number of animal units possessed by the three innovation categories. The primary objective of this analysis was to discover if any significant differences existed among the innovation categories concerning the total number of animal units managed, and the presence of animal types and programs which may be distinctive to the various innovation categories.

The animal unit was used to convert the wide range of animals of different weights and classes to a common denominator or base. An animal unit is defined simply as 1,000 pounds live weight of animal. The following table was used as a guide in the standardization process.

Table 23. Animal unit conversion coefficients.<sup>23</sup>

Animal	Estimated weight	Percentage of animal unit
Beef cow	1,000	1.0
Dairy cow	1,000	1.0
Winter, pasture and full feed (steers and heifers)	900	.9
Winter and full feed (steers and heifers)	800	.8
Winter and pasture (steers and heifers)	700	.7

<sup>23</sup>H. C. Love, J. H. Coolidge, R. D. McKinney, "More Money From Your Farm," Extension Service, Kansas State University, Circular 244, p. 8.

Table 23. (concl.).

Animal	: Estimated : weight	: :	Percentage of animal unit
Winter (steers and heifers)	600		.6
Sow	300		.3
Market hog	200		.2
Ewe	125		.125
Feeder pig	50		.05
Hens	5		.005

The statistical method employed in analyzing this section was the analysis of variance and the F-test of significance. The levels of probability were .05 and .10 in all cases.

In analyzing the three innovation categories for the years 1955, 1957, 1959 and 1970, a consistent rank order was established. The innovator consistently had the largest total number of animal units followed by the non innovator and limitational innovator. Significant differences at the .05 level were found among the three innovation categories for 1955, 1957 and 1959 while the differences in the farmers' opinions concerning the number of animal units they will have by 1970 proved to be significant at the .10 level.

The limitational and non innovators were combined and tested against the innovator category yielding significant F-values at the .05 level for every year considered.



Table 24. The analysis of variance and F-test of significance for selected animal unit characteristics by innovation categories.

Item	: Limitational :			: Significance
	: Innovator	: Innovator	: Non Innovator :	
	: Average	: Average	: Average	
	: animal units	: animal units	: animal units	
No. of animal units- 1955	108	34	63	**
No. of animal units- 1957	104	37	55	**
No. of animal units- 1959	124	49	51	**
No. of animal units- 1970	210	81	146	*

\* - significant at the .10 level of probability

\*\* - significant at the .05 level of probability

Table 25. Summary of the analysis of variance and F-test of significance for selected animal unit characteristics by reduced innovation categories.

Item	: Limitational and :		: Significance
	: Innovator	: Non Innovator :	
	: Average	: Average	
	: animal units	: animal units	
No. of animal units- 1955	108	43	**
No. of animal units- 1957	104	42	**
No. of animal units- 1959	124	50	**
No. of animal units- 1970	210	101	**

\*\* - significant at the .05 level of probability

The analysis of variance and F-test of significance were again employed to determine among which innovation categories the differences arose, for the years 1955, 1957 and 1959. There was a universal difference at the .05 level of probability between the innovator and limitational innovator for all of the years considered, while the innovator and non innovator were significantly different only in 1959. The limitational and non innovators proved to be significantly different at the .05 level during the year 1955 and significantly different at the .10 level in 1957.

Table 26. Summary of the analysis of variance and test of significance within innovation categories - 1955, 1957 and 1959.

Item	: :Innovator:	: Limitational: Innovator	: : Non Innovator:	Significance
1955				
Innovator vs Limitational Innovator	108	34		**
Innovator vs Non Innovator	108		63	ns
Limitational Innovator vs Non Innovator		34	63	**
1957				
Innovator vs Limitational Innovator	104	37		**
Innovator vs Non Innovator	104		55	ns
Limitational Innovator vs Non Innovator		37	55	*
1959				
Innovator vs Limitational Innovator	124	49		**
Innovator vs Non Innovator	124		51	**
Limitational Innovator vs Non Innovator		49	51	ns

\* - significant at the .10 level of probability

\*\* - significant at the .05 level of probability

ns - nonsignificant at the .05 and .10 levels of probability

In attempting to establish livestock systems or programs characteristic to each group, no measurable differences or consistencies which might identify a particular livestock program with a particular type of farmer could be found. The livestock systems most frequently mentioned by the entire population were the beef cow herd with feeder calf, beef calf systems, (which includes various combinations from the wintering, grazing and full feeding deferred feeding options) hogs and poultry.

Although there were no particular characteristic livestock programs identifiable to each innovator group, there was a consistent trend among the entire population toward more specialized forms of livestock programs. From 1955 to 1970 the number of enterprises on each farm decreased while the remaining enterprises became considerably larger. Beef cow herd, poultry and dairy suffered the greatest reduction in terms of the number of farmers employing the program while hogs and beef cattle feeding increased slightly.

The livestock enterprises showing the largest gain in number of head per farm from 1955 to 1970 were beef cattle feeding systems, hogs, and poultry.

It appears that the innovator has utilized the livestock resources in the operation of his farm business to a significantly greater extent than the limitational and non innovator. In predicting the relative importance of livestock on their farms in the future, it appears that the innovators will continue to utilize livestock enterprises to a considerably greater extent than the limitational and non innovators.

The limitational innovator was the least interested in livestock programs throughout the 1955-1970 period but did show consecutive increases in the

number of animal units on the farm while the non innovator continually decreased the number of animal units utilized.

There were no particular livestock programs identifiable to each innovation group; however, the entire population showed a continual reduction in the number of livestock systems per farm while increasing substantially the relative size of the remaining enterprises. Beef cow herd, dairy and poultry suffered the largest reduction in terms of the number of farmers employing the enterprise while hogs and beef cattle feeding showed a slight increase. The livestock enterprises demonstrating the largest increase in number of head per farm were beef cattle feeding systems, hogs and poultry.

#### BUSINESS EQUITY SECTION

##### Total Assets

The average amounts of total assets accumulated by the three groups of farmers were analyzed and it was found that the innovator group possessed the larger amount of total assets during the decade 1950-1960. If the farmers' anticipations for the next ten years develop in a manner coherent with their predictions, the innovators will continue to possess a considerably larger accumulation of total assets than the other two categories.

In 1960 the innovators had \$36,500 more total assets than the limitational innovators and \$33,700 more than the non innovators. By 1970 this difference will be increased to \$52,000 over the limitational innovators and \$47,000 over the non innovators. Another interesting characteristic is that the non innovators exceeded the limitational innovators in total assets by \$2,750 in 1960 and \$4,850 in 1970 (Tables 4, 5, and 6 in Appendix D).

The various sources contributing to total assets and the amount of their relative proportional contributions establishes notable differences among the innovation categories.

Table 27. Major factors contributing to total assets and the relative percentage importance of each by innovation categories - 1960.

Item	:Limitational:		
	: Innovator	: Innovator	: Non Innovator
	: % of total:	% of total :	% of total
Value of owned land	44	38	44
Value of machinery and equipment	16	28	18
Value of livestock	14	3	8
Total	74	69	70

Table 27 indicates that the innovator and non innovator received approximately the same relative percentage from land and farm machinery, but the innovator's percentage contribution from the value of livestock was twice as high as that of the non innovator. The limitational innovator appeared to be machinery-conscious and received a relatively higher percentage contribution from the value of farm machinery and equipment and less from owned land. The limitational innovator's value of livestock contributed the lowest percentage to total assets of any of the factors analyzed.

It appears that the limitational innovator possessed more machinery and equipment than the innovator or non innovator. The question which normally follows is, How much more machinery and equipment did the limitational innovator possess than the other two categories?.

The actual monetary difference which occurred within the machinery investment category indicates that in 1959 the limitational innovator managed an

average of \$20,564 worth of machinery, the innovator \$18,193 and the non innovator \$14,562 worth of equipment.

Although no statistically significant difference could be found, it is apparent that the limitational and non innovators were more interested in crop production and managed a larger amount of machinery and equipment. This conclusion is also congruous with the findings in the land and income sections where it was found that the limitational innovator managed a considerably larger cropland acreage, and the combined income of the limitational and non innovators from the sale of crops superceded that received by the innovator group.

Table 28. Analysis of variance and F-test of eignificance concerning the 1959 average machinery investment by innovation categories.

Year	Innovator Ave. value (dollars)	Limitational Innovator Ave. value (dollars)	Non Innovator Ave. value (dollars)	Significance
1959	18,193	20,564	14,562	ns

ns - nonsignificant at the .05 and .10 levele of probability

The limitational and non innovators were combined and a Mann-Whitney T-test of significance was employed to test for significant differences in the accumulation of total assets for 1960 and 1970. Both the 1960 and 1970 computations revealed a nonsignificant difference at the .10 level of probability but both T-values came exceedingly close to a significant difference.

Table 29. Mann-Whitney T-test of significance for accumulations of average total assets by reduced innovation categories.

Year	Innovator			Limitational & Non Innovator			diff.	:
	Average : :(dollars):	Number of : observations:	Ave. : rank:	Average : :(dollars):	Number of : observations:	Ave. : rank:		
1960	111,027	20	18.9	75,391	22	23.7	35,636	ns
1970	137,075	20	22.6	86,800	20	18.3	50,275	ns

ns - nonsignificant at the .05 and .10 levels of probability

#### Total Liabilities

The trends toward the average expansion of total debts indicate that the innovator group has consistently employed the credit instrument to a considerably greater extent than the limitational and non innovator.

It is apparent from Tables 4, 5 and 6 in Appendix D that all three innovation categories have consistently used more credit in the operation of their farm business during the past two decades. Attention should also be directed to the tremendous rate of increase in the use of credit by the innovators during the period 1950-1960 while the limitational and non innovators progressed at approximately the same rate. In 1950 the innovators had an average of \$3,658 more debts than the limitational innovators and \$3,786 more than the non innovators. By 1960 this difference amounted to \$13,850 more debts than the limitational innovators and \$14,087 more than the non innovators.

In estimating their debt structure for 1970 all three groups indicated a desire to reduce the amount by different proportions. The innovators planned the largest reduction of total debt of \$9,380 per farm. The limitational innovators planned to cut their debt about \$2,365 per farm and the non innovators \$957 per farm.

In 1950 total debts were 14% of total assets for the innovator as compared to 9% and 8% for the limitational and non innovators. By 1960 total debts increased to 19% of the innovator's total assets as compared to 9% for both the limitational and non innovators. Their estimates for 1970 indicate that total debts will be 8% of total assets for the innovators (or a reduction of 11% from 1960) as compared to 5% for the limitational innovators (a reduction of 4% from 1960) and 6% for the non innovators (a reduction of 3% from 1960).

All three categories feel the coercion surrounding the debt burden and plan to reduce these obligations as much as they possibly can. It is important to note that the relative reduction of debts per farm from 1960 to 1970 is proportionately larger between the innovators and limitational innovators than the non innovators.

The innovators are undoubtedly approaching what they hold to be their optimum farm organization much earlier than the other two innovation categories; consequently, they intend to reduce their amounts of total debts more drastically in the future.

The process used to test for significant differences in the accumulation of total liabilities during 1960 and 1970 was to combine the limitational and non innovators and run a Mann-Whitney T-test of significance. A significant difference was found in the amounts of total liabilities incurred for 1960.



Table 30. Mann-Whitney T-test of significance for accumulations of average total liabilities by reduced innovation categories.

Year	Innovator			Limitational & Non Innovator			diff.
	Average value : (dollars)	Number of observations :	Ave. rank :	Average value : (dollars)	Number of observations :	Ave. rank :	
1960	20,830	20	15.0	6,905	22	27.4	13,925 **
1970	11,450	20	22.7	5,025	20	18.3	6,425 ns

\*\* - significant at the .05 level of probability

ns - nonsignificant at the .05 and .10 levels of probability

In analyzing the factors contributing to the debt load it was found that debts on real estate and machinery were the universal sources of liabilities to the three groups of farmers.

Table 31. Major factors contributing to total liabilities and the relative percentage of importance of each by innovation categories.

Item	Innovator		Limitational Innovator		Non Innovator	
	% of total : 1960	% of total : 1970	% of total : 1960	% of total : 1970	% of total : 1960	% of total : 1970
Debts on real estate	35	24	57	71	23	37
Debts on machinery and equipment	60	76	43	29	77	63
Other notes	5					

Table 31 indicates that debts on machinery and equipment amount to 60% to 70% of the total debts of the innovator and non innovator both for 1960 and 1970. The limitational innovator, however, had 50% to 70% of his debt burden in the area of real estate and less in machinery and equipment. It can be recalled that in the preceding section on total assets, farm machinery and

equipment contributed approximately 30% to total assets of the limitational innovators which was a considerably larger percentage than that of the innovators and non innovators. It appears that the limitational innovator has made a special effort to keep his machinery debts to a minimum.

It is concluded that the innovator consistently uses more credit than the limitational and non innovators. It is also surmised that the limitational innovator and non innovator are more interested in the purchase of land during the next decade rather than additional machinery. The limitational innovator predicts the proportional debt on real estate will increase from 57% in 1960 to 71% in 1970 while the proportional debt on farm machinery will decrease from 43% in 1960 to 29% in 1970. The innovators' assumptions are directly opposite of those expressed by the limitational innovator, as the innovator predicts that debts on real estate will decrease from 35% in 1960 to 24% in 1970 while debts on farm machinery will increase from 60% to 76% during the 1960's.

The innovator realizes the importance of new and better types of farm machinery in the operation of the farm business and estimates he will be using a proportionately larger amount of credit for this equipment by 1970. The limitational and non innovators are obviously satisfied with their present machinery inventory and are more interested in the purchase of additional land as indicated by their interest in wanting to borrow a large proportion of money for the purchase of real estate.

#### Net Worth

The trend in accumulation of net worth follows a pattern which closely parallels that of the two preceding sections on total assets and total liabilities.

In 1960 the innovators had approximately \$19,676 more net worth than the non innovators and \$22,660 more than the limitational innovators. The 1970 predictions indicate that the innovator will expand his holding of net worth to the point where he will have \$41,454 more net worth than the non innovator and \$45,140 over the limitational innovator.

The test for significant differences in the accumulation of net worth by innovation categories for 1960 and 1970 involved the combination of the limitational and non innovators and the employment of the Mann-Whitney T-test of significance.

Table 32. Mann-Whitney T-test of significance for accumulations of net worth by reduced innovation categories.

Year	Innovator			Limitational & Non Innovator			diff.	ns
	:(dollars):	: observations:	: rank:	value	: observations:	: rank:		
1960	90,197	20	18.9	68,486	22	23.8	21,711	ns
1970	125,625	20	22.3	81,775	20	18.7	43,850	ns

ns - nonsignificant at the .05 and .10 levels of probability

No significant differences were found between the two groups for 1960 and 1970 but it should be noted that the T-values for 1960 came very close to yielding a statistically significant difference at the .10 level of probability and did yield a significant difference at the .25 level of probability. The innovator anticipates increasing his accumulations of net worth by approximately \$22,000 over the combined limitational-non innovator by 1970.

## Review and Conclusions

The analysis of the business equity sections revealed the innovators managing a considerably larger amount of total assets, carrying a consistently heavier debt burden and possessing a considerably larger amount of net worth. The value of owned land, machinery and equipment, and livestock universally comprised 70% of the total assets of the three innovation categories. The innovators and non innovators accumulated approximately the same percentage proportions of total assets from the same sources; land contributed 44%, machinery and equipment 17% and livestock 8-14%. The limitational innovator obtained 38% of total assets from land, 28% from machinery and equipment, and only 3% from livestock.

It is concluded that the limitational innovator carries a larger investment in machinery and a significantly smaller investment in livestock than the innovator and non innovator. The limitational innovator is interested primarily in growing larger quantities of feed grains and marketing them on a cash basis, while the innovator and non innovator raise smaller quantities of feed grains but feel that more money can be received from the feed grains when they are marketed through livestock.

The liability section indicated that the innovator utilized considerably more credit than the limitational and non innovators. In predicting the structure of their liabilities by 1970 some interesting trends became evident. The innovator predicted that a relatively higher percentage of his 1970 debts would be attributed to ownership of machinery and equipment and less to real estate while the limitational and non innovators envisioned real estate increasing the liability structure and machinery and equipment decreasing in relative importance.

It is concluded that the innovator uses more credit in the operation of the farm business and is more conscious of the importance of machinery and equipment in the proper operation of the farm business while the limitational and non innovators place more interest in the ownership of farm real estate.

The net worth analysis closely parallels the findings in the two previous sections; namely, that the innovator consistently manages a larger net worth than the limitational and non innovator. It is also important to note that the difference in the accumulation of net worth between the innovation categories has consistently been increasing over the past twenty years, and all indications imply that this trend will continue into the future.

#### FARM BUSINESS INCOME AND EXPENDITURES

The analysis of the income and expense section of the farm business utilized the individual state income tax returns of the population as the primary source of information. Unfortunately not all the farmers gave permission to allow their income tax returns to be analyzed, thus the limitational and non innovators had to be combined into one category and compared against the innovator group. The reason for this combination was based on the fact that only three non innovator income tax schedules were available for study, and valid mean averages could not be drawn from this limited amount of data. Eighty-five percent of the innovators signed the power of attorney to allow their state income tax returns to be used in the analysis while only 73% and 57% of the limitational and non innovators consented to the request.

The Mann-Whitney T-test of significance was employed in testing for significant differences between the two groups. The level of probability was .05 and .10 in all cases.

## Income

Sources of Farm Income. The sources of farm income were divided into the following classifications: (1) sale of livestock, (2) sale of crops, (3) sale of other farm produce and (4) other farm income.

It should be noted that within this analysis livestock sales apply to the sale of all red meat while the sale of the by-products of the livestock enterprises such as eggs, milk, cream, etc. are included under the section sale of other farm produce. The sale of crops section includes the gross receipts resulting from the sale of all grains and roughages. Other farm income includes such factors as gas tax refunds, custom work and all other income that can directly be associated with the operation of the farm business.

Items which were excluded from the farm income analysis included oil leases; fees for extra services such as directorships of banks, agricultural committees, etc.; and large off-farm employment in excess of \$500. This does not include custom work. There was an allowance made for employment up to the arbitrary amount of \$500, primarily because the amount was so small in most cases that it did not warrant an additional separation and tabulation process.

For a more complete analysis of the procedure used in tabulating the income data, the key to income and expense analysis is included in Appendix E.

## Gross Farm Income

Gross Receipts from the Sale of Livestock. Gross receipts from the sale of livestock represented 35% to 50% of the gross income received by the innovators and 26% to 28% of the gross income received by the combined limited and non innovators during the years 1955, 1957 and 1959.

Table 33. Gross receipts from the sale of livestock by reduced innovation categories - 1955, 1957 and 1959.

Year	Innovator			Limitational & Non Innovator					
	Average value	Number of observations	Ave. rank	Average value	Number of observations	Ave. rank	Average value	Average diff.	
	:(dollars):	:	:	:(dollars):	:	:	:(dollars):	:(dollars):	
1955	7,381	14	17.5	3,535	13	10.2	3,846	**	
1957	6,148	17	17.3	2,881	14	14.5	3,267	ns	
1959	12,363	12	8.9	4,271	13	16.8	8,092	**	

\*\* - significant at the .05 level of probability

ns - nonsignificant at the .05 and .10 levels of probability

It is concluded that the innovators utilize the livestock resource more and sell a significantly greater amount of red meat than the combined limitational and non innovator categories. This conclusion is also in agreement with the preceding livestock section where significant differences were found among the innovation categories regarding the number of animal units on the farm.

Gross Receipts from the Sale of Crops. Gross receipts from the sale of crops represented 35% to 40% of the gross income of the innovators and 45% to 60% of the combined limitational and non innovators during the years 1955, 1957 and 1959.

Table 34 indicates the results of the test of significance concerning the sale of crops between innovation categories.

Table 34. Gross receipts from the sale of crops by reduced innovation categories - 1955, 1957 and 1959.

Year	Innovator			Limitational & Non Innovator				diff.	ns
	Average value (dollars)	Number of observations	Ave. rank	Average value (dollars)	Number of observations	Ave. rank	Average value (dollars)		
1955	7,328	14	14.6	8,178	13	13.4	850	ns	
1957	5,560	17	16.9	4,737	14	14.8	823	ns	
1959	9,393	12	12.6	9,534	13	13.4	141	ns	

ns - nonsignificant at the .05 and .10 levels of probability

In the analysis of the sale of crops it should be noted that the limitational and non innovator categories received a slightly higher average gross income from the sale of crops, and this income makes approximately the same percentage contribution to gross income as livestock sales did to the innovator group in the preceding section.

The conclusions drawn within this section coincide with the findings of the previously reported land and equity section, where it was indicated that the limitational and non innovator categories managed a greater amount of cropland and had a relatively higher average machinery investment per farm.

Sale of Other Farm Produce. Sale of other farm produce consists of approximately 10% of the gross income of the innovators and 5% of the gross income of the limitational and non innovators for the years 1955, 1957 and 1959.



Table 35. Gross receipts from the sale of other farm produce by reduced innovation categories.

Year	: Innovator :			: Limitational & Non Innovator :			: diff. :	:
	: Average :	: Number of :	: Ave. :	: Average :	: Number of :	: Ave. :		
: (dollars):	: observations:	: rank:	: value :	: observations:	: rank:	: value :	: (dollars):	: (dollars):
1955	1,565	14	13.2	1,003	13	14.9	562	ns
1957	2,466	17	14.7	489	14	17.5	1,977	ns
1959	1,858	12	12.9	396	13	13.1	1,462	ns

ns - nonsignificant at the .05 and .10 levels of probability

It is apparent that the innovator group sells a relatively higher average amount of eggs, milk and other livestock products than the limitational and non innovator group.

The results of the foregoing analysis are also in agreement with the findings of the livestock section which indicated that the innovators possessed a significantly greater number of animal units than the combined limitational and non innovators. Since other farm produce consists primarily of products produced by animals, it is logical that the innovators would continually sell a greater amount.

Other Farm Income. Other farm income consisted of approximately 8% of the gross income of the innovators and the combined limitational and non innovators for the years 1955 and 1959. There was a substantial increase in the relative percentage importance of other farm income in 1957 which can be primarily attributed to the exceptionally large incomes resulting from government subsidization payments, dividends received from agricultural-related business agencies, and the drought conditions experienced by the area. In a few isolated cases receipts from government subsidization payments and co-op

dividends totaled as high as \$10,000 per farmer. The same type of trend is evidenced in Farm Management Association No. 2 summary and analysis reports where miscellaneous income increased from \$1,002 in 1956 to \$2,096 in 1957 and dropped to \$1,147 in 1959.<sup>24</sup> This amount ranged from 11% of the gross income in 1957 to 5% of the gross income in 1959. There are no data available for 1955.

Table 36. Summary of other farm income by reduced innovation categories.

Year	Innovator			Limitational & Non Innovator			
	value : observations : (dollars)	Number of : rank :	Ave. : rank :	value : observations : (dollars)	Number of : rank :	Ave. : rank :	Average : diff. : (dollars)
1955	1,622	14	15.1	1,098	13	12.8	524 ns
1957	2,305	17	17.0	2,717	14	14.8	412 ns
1959	1,653	12	12.9	1,079	13	13.1	574 ns

ns - nonsignificant at the .05 and .10 levels of probability

It is concluded that the amounts received from other farm income do not differ between the two innovation categories. Discounting the exceptions to the rule which occurred in 1957, it is apparent that other farm income contributes approximately 5% to 8% to the gross income of all three of the innovation categories included within this study.

Gross Farm Income. In analyzing the gross incomes between the combined limitational and non innovator and the innovator for the years 1955, 1957 and 1959 the following results were obtained.

<sup>24</sup>Farm Management Summary and Analysis Report, Kansas State University, Section 2, p. 3.

Table 37. Gross farm income by reduced innovation categories - 1955, 1957 and 1959.

Year	Innovator			Limitational & Non Innovator						
	Average value (dollars)	Number of observations	Ave. rank	Average value (dollars)	Number of observations	Ave. rank	Average value (dollars)	Number of observations	Ave. rank	diff.
1955	17,896	14	15.4	13,815	13	12.5	4,081	ns		
1957	16,479	17	18.4	10,824	14	13.1	5,655	**		
1959	25,267	12	9.9	15,281	13	15.8	9,986	**		

\*\* - significant at the .05 level of probability

ns - nonsignificant at the .05 and .10 levels of probability

The gross income analysis is consistent with the findings of the preceding livestock, crop, other farm produce and other farm income sections which were previously analyzed. The innovator group received a higher average income in every area of analysis except the crops section. The innovator group has consistently increased its average gross income over the combined limitational and non innovator up to the point where statistical differences at the .05 level of probability were found in 1957 and 1959.

The primary reason for the considerably larger gross income enjoyed by the innovator group can be attributed to the sale of livestock. The innovator averaged approximately \$3,800 more income in 1955 which was statistically significant, \$3,200 in 1957 which resulted in a nonsignificant test, and in 1959 the average receipts received from the sale of livestock increased to \$8,100 over the limitational and non innovator and the corresponding gross income increased sufficiently enough to yield a statistically significant difference.

Table 38. Analysis of the various income segments contributing to gross farm income and the relative percentage importance of each segment by reduced innovation categories - 1955, 1957 and 1959.

Income Segments	Innovators			Limitational and Non Innovators								
	1955	1957	1959	1955	1957	1959						
	: % of :	: % of :	: % of :	: % of :	: % of :	: % of :						
	: Gross:	: Gross:	: Gross:	: Gross:	: Gross:	: Gross:						
	: Amount:	: Amount:	: Amount:	: Amount:	: Amount:	: Amount:						
Sale of livestock (red meat)	7,381	41	6,148	37	12,363	49	3,535	26	2,881	27	4,271	28
Sale of crops	7,328	41	5,560	34	9,293	37	8,178	59	4,737	44	9,534	62
Sale of other farm produce*	1,565	9	2,466	15	1,858	7	1,003	7	489	4	396	3
Other farm income**	1,622	9	2,305	14	1,653	7	1,098	8	2,717	25	1,079	7
Gross farm income	17,896	100	16,479	100	25,267	100	13,815	100	10,824	100	15,281	100

\* - Other farm produce includes sales of eggs, milk, meat products which have been processed, etc.  
 \*\* - Other farm income includes proration from co-op elevators, gas tax refunds, soil bank payments, crop damage, cash rents for farm real estate, hiring out machinery and truck, and off farm labor up to a maximum of \$500.

## Net Farm Income

The following discoveries were made after analyzing and testing the net income section for significant differences between innovation categories.

Table 39. Summary of net income by reduced innovation categories - 1955, 1957 and 1959.

Year	Innovator			Limitational & Non Innovator				diff.	:
	value :(dollars):	Number of observations:	Ave.: rank:	Average value :(dollars):	Number of observations:	Ave.: rank:	Average value :(dollars):		
1955	4,159	14	15.1	3,413	13	12.8	746	ns	
1957	3,015	17	18.4	1,405	14	13.1	1,610	**	
1959	5,074	12	10.9	3,231	13	14.9	1,843	ns	

\*\* - significant at the .05 level of probability

ns - nonsignificant at the .05 and .10 levels of probability

The net farm income analysis follows the same trend established by the analysis undertaken in the preceding paragraphs. The innovator has consistently received a higher net income than the combined limitational-non innovator category. The amount of difference between the two categories has increased from \$746 in 1955 to \$1,843 in 1959. The innovator group has continually employed superior management ability over the combined limitational-non innovator group and this ability has been rewarded in the form of more net income.

## Farm Business Expenditures

The information used in analyzing the factors included within this section were also derived exclusively from the state income tax returns.

The limitational and non innovators were again combined under the same rationale employed in the preceding income analysis. The Mann-Whitney T-test of significance was employed with the degree of probability remaining at the .05 and .10 levels of probability.

Cash Rent. The analysis of the amount paid out for cash rent indicates that with the exception of 1955 the combined limitational and non innovators have paid out an average of \$250 more cash rent than the innovators. This conclusion is difficult to measure and compare with the results derived from the land analysis section because no conclusive evidence is available concerning the types of leases which each of the farmer's possesses.

Based upon the results of the statistical test employed it was concluded that the amounts paid out for cash rent do not statistically differ between the innovation categories.

Table 40. Average amounts paid out for cash rent by reduced innovation categories - 1955, 1957 and 1959.

Year	Innovator			Limitational & Non Innovator				ns
	Value (dollars)	Number of observations	Ave. rank	Average value (dollars)	Number of observations	Ave. rank	Average value (dollars)	
1955	632	14	13.6	602	13	14.4	30	ns
1957	289	15	17.4	545	14	12.4	256	ns
1959	424	12	12.0	654	13	13.9	230	ns

ns - nonsignificant at the .05 and .10 levels of probability

Depreciation. The amounts claimed for depreciation by the two innovation categories were analyzed and it was found that the innovator group claimed approximately \$1,000 to \$1,500 more than the combined limitational and non innovator for the years 1955-1959. It was concluded that the innovators claim a considerably larger amount of depreciation annually than the combined

limitational and non innovators. The amounts were statistically different at the .10 level of probability for the years 1957 and 1959.

Tables 4, 5, and 6 in Appendix D surrounding equity in the farm business indicate that the innovators have a larger gross value of depreciable assets than the combined limitational and non innovators which is one of the reasons explaining this obvious difference in depreciation claimed. It is also realized that significant differences may exist between the innovation categories as to efficiencies in claiming sufficient amounts of depreciation. Unfortunately sufficient data is lacking to pursue this type of analysis.

Table 41. Amounts claimed for depreciation allowance by reduced innovation categories.<sup>1</sup>

Year	Innovator			Limitational & Non Innovator			diff.	:
	:(dollars):	Number of observations:	Ave.: rank:	:(dollars):	Number of observations:	Ave.: rank:		
1955	3,182	14	16.2	2,195	13	11.6	987	ns
1957	2,832	17	18.4	1,842	14	13.1	990	*
1959	3,917	12	10.2	2,314	13	15.6	1,603	*

<sup>1</sup> - includes all depreciable items--machinery, buildings, etc.

\* - significant at the .10 level of probability

ns - nonsignificant at the .05 and .10 levels of probability

Insurance. The analysis surrounding the amount of money paid out for insurance indicates that the limitational and non innovator have paid out an average of \$100 more per year from 1955-1959 than the innovator. It is interesting to note that in 1957 a statistically significant difference at the .10 level of probability was found in the amount paid out for insurance between the two innovation categories.

Based upon the results of this investigation, it is concluded that the limitational and non innovators tend to employ a more conservative business

philosophy than the innovator.

Table 42. Average amounts paid out for insurance by reduced innovation categories.

Year	Innovator			Limitational & Non Innovator				ns
	Average : value : (dollars):	Number of : observations:	Ave.: rank:	Average : value : (dollars):	Number of : observations:	Ave.: rank:	Average : diff. : (dollars):	
1955	109	14	15.4	226	13	12.5	117	ns
1957	85	15	17.5	260	14	12.3	175	*
1959	170	12	11.7	224	13	14.2	54	ns

\* - significant at the .10 level of probability

ns - nonsignificant at the .05 and .10 levels of probability

Hired Machinery and Trucking. The limitational and non innovator have paid out approximately \$125 more for hired machinery and trucking from 1955-1959 than the innovator. This relatively small amount indicated no significant differences between the innovation groups but it did follow logically with the preceding land and equity analysis. The limitational innovator farms more acre of land, and even though his machinery investment is somewhat larger than the innovator the time factor during critical periods of the growing season necessitates his hiring additional machinery and equipment.

Table 43. Average amounts paid out for hired machinery and trucking by reduced innovation categories.

Year	Innovator			Limitational & Non Innovator				ns
	Average : value : (dollars):	Number of : observations:	Ave.: rank:	Average : value : (dollars):	Number of : observations:	Ave.: rank:	Average : diff. : (dollars):	
1955	254	14	14.8	377	13	13.1	123	ns
1957	455	15	15.5	580	14	14.5	125	ns
1959	454	12	12.4	614	13	13.5	160	ns

ns - nonsignificant at the .05 and .10 levels of probability



Interest. The innovator utilizes the credit privilege to a considerably greater extent than the combined limitational and non innovator. The innovator's interest payments exceeded those of the limitational-non innovator group by approximately \$200 in 1955 and by \$675 in 1959.

The previously analyzed equity section indicated a considerably larger debt load on the innovators and it is only logical that the interest rates would be higher for this larger amount of credit utilized. It is concluded that the innovator uses more credit in the operation of his farm business and possesses a liberal philosophy while fully realizing the importance of credit in the administration of a sizable business unit.

Table 44. Average amounts paid out for interest by reduced innovation categories.

Year	Innovator			Limitational & Non Innovator			diff.	ns
	Average value (dollars)	Number of observations	Ave. rank	Average value (dollars)	Number of observations	Ave. rank		
1955	348	14	15.3	156	13	12.5	192	ns
1957	297	15	13.9	289	14	16.2	8	ns
1959	1,220	12	11.5	544	13	14.4	676	ns

ns - nonsignificant at the .05 and .10 levels of probability

#### Review and Conclusions

The income and expense analyses provided many insights into the operations of the farm business by innovation categories for the years 1955-1959.

The innovators consistently received the higher gross and net incomes which can be directly correlated to the utilization of the livestock resource. The innovator received an average of approximately \$8,000 income from the

sale of livestock while the limitational-non innovator averaged \$3,500.

The limitational-non innovator group received a slightly larger income from the sale of crops but the innovators dominated the remaining sale of other farm produce and other farm income sections.

The innovator obviously employed a greater amount of superior management ability and this ability was rewarded by the receipt of an additional \$1,000 to \$1,500 net income.

The farm business expenditures section revealed some interesting facts which illustrate the relevant costs associated with the operation of each of the farm businesses and present possible explanations for the resulting differences in the various sources of income.

The limitational and non innovator paid approximately \$250 more per year in the form of cash rent. This rent presumably applied to the house, outbuildings and other improvements, plus pastureland.

The limitational and non innovators also carried an average of \$100 more insurance and spent approximately \$125 more for hired machinery and trucking than the innovator.

The innovator, on the other hand, claimed approximately \$1,000 to \$1,500 more depreciation annually and paid out an average of \$300 to \$400 more for interest on borrowed capital.

Another rule of thumb for analyzing the relative success of a farmer's management ability is the percentage the net income is of gross income. The following table compares the relative percentages of net income to gross income by innovation categories.

Table 45. Comparisons of gross income to net income by farm groups - 1955, 1957 and 1959.

Farm Group	1955			1957			1959		
	Gross income	Net income	% of gross	Gross income	Net income	% of gross	Gross income	Net income	% of gross
Innovator	17,896	4,159	23%	16,479	3,015	18%	25,267	5,074	20%
Limitational & Non Innovator	13,815	3,413	25%	10,824	1,405	13%	15,281	3,231	21%

It should be noted that the innovator consistently had the larger gross and net income while the percentage net income was of gross income did not fluctuate considerably between the two groups.

As a means of final comparison the following table summarizes how the two innovation categories compare as to the amounts and relative proportional sources of gross and net farm incomes in 1959 against the average of the Farm Management association located in the south central Kansas area.

Table 46. Sources of gross and net farm income - 1959.<sup>1</sup>

Item	Innovator		Limitational and Non Innovator		Farm Mgt. Assn. Number 2	
	Amount	% of total	Amount	% of total	Amount	% of total
Livestock income*	14,382	57%	4,517	30%	11,601	51%
Crop income	9,393	37%	9,534	62%	10,050	44%
Miscellaneous income*	1,492	6%	1,228	8%	1,147	5%
Gross farm income	25,267	100%	15,279	100%	22,798	100%
Net income	5,074		3,231		4,416	

<sup>1</sup> - Farm Management association computations are made on the accrual basis while the calculations of this study were made primarily on a cash basis

\* - adjusted to comply with the Farm Management association computations

LABOR REQUIREMENTS NECESSARY IN THE  
OPERATION OF THE FARM BUSINESS

Analysis of the labor inputs for the innovator, limitational innovator and non innovator categories illustrated that the operators all devoted approximately eleven months of labor in the operation of their farm business in 1959. This labor was employed fully during the four summer months and during seven of the remaining eight months of the year. The innovator did not use his wife in the physical operation of the business while the limitational innovator and non innovator employed their wives two and three months respectively during the years 1955 to 1959.

The innovator replaced the wife's efforts by employing the children and other family approximately five months out of the year and utilizing the equivalent of eight months of hired labor. The limitational and non innovator each utilized two months of child labor and the equivalent of one month of hired labor.

The same sources of labor were utilized when the farmers estimated the future labor requirements for their farm business. The innovator will devote approximately 11 months equivalent of labor, employ the children and other family approximately six months, and utilize eight months of hired labor equivalent. The limitational innovator estimated that he will devote approximately twelve months of labor on the farm plus one month equivalent of his wife, five months equivalent of his children and other family and approximately three months equivalent of hired labor. The non innovator estimated his future farm business will require eleven months of operator labor, three months of wife labor, one month of other family labor and approximately one month of hired labor equivalent.

Table 47. Average months of labor devoted to farm work by innovation categories - 1955, 1959 and 1970.

Individual and Season	Innovator			Imitational Innovator			Non Innovator		
	:1955	: 1959	: 1970	: 1955	: 1959	: 1970	: 1955	: 1959	: 1970
Operator									
Summer	4	4	4	4	4	4	4	4	4
Other months	8	7	7	8	7	8	7	7	7
Wife									
Summer	-	-	-	1	1	-	1	1	1
Other months	-	-	-	1	1	1	2	2	2
Children									
Summer	1	2	3	1	2	2	2	2	1
Other months	1	1	1	-	-	1	-	-	-
Other family									
Summer	-	1	1	1	1	1	-	-	-
Other months	1	1	1	1	1	1	-	-	-
Hired help									
Summer	3	4	4	2	1	2	1	1	1
Other months	2	4	4	1	-	1	-	-	-
Total labor equivalent	20	24	25	20	18	21	17	17	16

Summer - includes the months of May, June, July and August  
 Other months - include the months from September to May

In analyzing the amounts paid out for hired labor as reported on the state income tax forms, significant differences were found at the .05 level between the innovators and limitational and non innovators during the years 1957 and 1959.

Table 48. Average amounts paid out for hired labor by reduced innovation categories.

Year	Innovator			Limitational & Non Innovator			Year	diff.
	:(dollars):	: observations:	: Ave. rank:	:(dollars):	: observations:	: Ave. rank:		
1955	886	14	16.2	577	13	11.6	309	ns
1957	1,143	15	18.6	439	14	11.1	704	**
1959	1,795	12	8.0	490	13	17.6	1,305	**

\*\* - significant at the .05 level of probability

ns - nonsignificant at the .05 and .10 levels of probability

The amount spent for hired labor was also analyzed and it was found that the innovators averaged \$29.00 more per farm from 1955 to 1957 and \$46.00 more per farm from 1957 to 1959.

Table 49. Average change in the amount paid out for hired labor by reduced innovation categories - 1955, 1957 and 1959.

Farm classification	Ave. dollar increase per farm		Ave. dollar increase per farm	
	: 1955	: 1957	: 1957	: 1959
Innovators	886	18.00	1143	50.00
Limitational & Non Innovators	577	-11.00	439	4.00

It is concluded that the innovator used approximately six more total labor equivalent months in the operation of his farm business and continually substituted his wife's efforts by employing additional hired labor.

The innovator employed hired labor the equivalent of eight months per year while the limitational and non innovator used approximately two months equivalent of hired labor.

In comparing the three innovation categories of farmers with the general farmer section of the Rice County Rural Economic Development study, it was found that the general farmers employed only 15.5 months equivalent in the farm business as compared to 24 for the innovator, 18 for the limitational innovator and 17 for the non innovator.

The general farmer used 2.5 months equivalent work from the wife which parallels that of the limitational and non innovator.

In the area of hired labor the general farmer employed 2.5 months equivalent of labor while the innovator employed eight and the limitational and non innovators approximately two months each.

The amounts paid out for hired labor show the innovators spending an average of \$309 more per year in 1955, \$704 more in 1957 and \$1,305 more in 1959 than the limitational and non innovators. The \$704 difference in 1957, and the \$1,305 difference in 1959 proved to be significantly different at the .05 level of probability.

## FAMILY LIVING

The overall high quality of the population under study again became evident in the analysis of the living standards of the three groups of farmers. A universally high percentage of all the respondents possessed modern family living conveniences. Table 50 indicates the relative percentage proportions of the family living facilities utilized by the three innovation categories. Based on the distribution of the facilities available, it would have to be concluded that the innovators, limitational innovators and non innovators do not differ in the amount of living conveniences they utilize and enjoy.

After examining the obviously equal distribution of modern family living conveniences possessed by the three innovation groups the next area of analysis pertains to the amount of money necessary to provide for this prominent standard of living, and also personal opinions regarding the amounts of income necessary to meet the needs of above-average farm families.

The analysis of variance and F-test of significance were used in testing for significant differences among the innovation categories. The levels of probability were .05 and .10 in all cases.

The 1959 average living costs indicated that the innovator required an average of \$4,529 per year and the limitational innovator and non innovator \$3,329 and \$3,214 respectively. These costs were tested with the resulting F-value of 1.74 being nonsignificant (Table 52). The limitational and non innovators were then combined and tested against the innovator group with the resulting F-value of 3.56 yielding a statistically significant difference (Table 53).

The respondents were then asked about the amount of annual income necessary to meet the needs of an above-average farm family. The innovators estimated





that an average of \$7,825 was necessary while the limitational and non innovators considered averages of \$7,207 and \$6,286 respectively. The three groups were tested with the resulting F-value of .689 being nonsignificant (Table 52). The combined limitational and non innovator test against the innovators also provided a nonsignificant F-value of .954 (Table 53).

When asked how much income would be necessary to meet the minimum needs of an above-average farm family, the innovators estimated an average of \$4,580 while the limitational and non innovators considered \$4,773 and \$4,286 respectively. A test of significance was run with the resulting F-value of .171 being nonsignificant (Table 52). The limitational and non innovators were again combined and tested against the innovator class with the resulting F-value of .006 also nonsignificant (Table 53). The respondents were also asked to estimate what they felt would be a reasonable average income for all farm families. The innovators suggested an average of \$5,370 while the limitational and non innovators considered \$4,347 and \$4,686 respectively. The tests were again run individually and with the combined limitational and non innovator option and yielded F-values of .827 and 1.72 respectively. Both values were nonsignificant (Tables 52 and 53).

In analyzing the amount of savings and cash on hand which each of the innovator's possessed the respondents were asked, For how long do you think your family could live at its present level on your savings and cash on hand if your income were cut in half?. The Kolmogorov-Smirnov deviation test was employed and yielded no significant deviation between the two innovation categories.

Table 51. Length of time which the reduced innovation categories could live on their accumulated savings and cash on hand if their incomes were cut in half.

Item	Innovator	C.F.	Limitational and Non Innovator	C.F.
12 months or more	10	.50	13	.59
6 to 12 months	5	.75	6	.86
3 to 6 months	1	.80	2	.95
Less than 3 months	4	1.00	1	1.00
Total	20		22	

$$D_{.05} = 1.36 \sqrt{\frac{N_1 + N_2}{n_1 n_2}} = .42$$

In a final effort to analyze the security and personal contentment which the farmers were experiencing in their chosen profession, the group was asked to indicate how much annual salary would have to be offered in an off-the-farm job, assuming good living conditions, security and self-satisfaction in the new job, before they would leave the farm. The innovators indicated an average of \$9,026 while the limitational and non innovators indicated \$8,500 and \$8,017 respectively.

The groups were again tested individually and with the combination limitational and non innovator option with nonsignificant F-values of .217 and .368 being received (Tables 52 and 53). It is also interesting to note that the range of estimates within the entire population varied from \$3,600 which was estimated by a non innovator to \$20,000 sought by an innovator. One innovator and one non innovator indicated they would not leave the farm for any price.

Table 52. Summary of the analysis of variance and F-test of significance for selected family living characteristics by innovation categories.

Item	: Limitational :			: Significance
	: Innovator	: Innovator	: Non Innovator :	
	: Average	: Average	: Average	
	: (dollars)	: (dollar)	: (dollars)	
Average family living costs - 1959	4,529	3,329	3,214	ns
Opinions as to average annual income necessary to meet needs of above average farm family	7,825	7,207	6,286	ns
Opinions as to average annual income necessary to meet minimum needs of above average farm family	4,580	4,773	4,286	ns
Opinions as to reasonable average income for all farm families	5,370	4,347	4,686	ns
Average opportunity salary to move farmers off the farm	9,026	8,500	8,017	ns

ns - nonsignificant at the .05 and .10 levels of probability

Table 53. Summary of the analysis of variance and F-test of significance for selected family living characteristics by reduced innovation categories.

Item	: Limitational and :		: Significance
	: Innovator	: Non Innovator	
	: Average	: Average	
	: (dollars)	: (dollar)	
Average family living costs - 1959	4,529	3,290	*
Opinions as to average annual income necessary to meet needs of above average farm family	7,825	6,914	ns

Table 53. (concl.).

Item	: Innovator	: Limitational and	:
	: Average	: Non Innovator	: Average
	:(dollars)		:(dollars)
			: Significance
Opinions as to average annual income necessary to meet minimum needs of above average farm family	4,580	4,618	ns
Opinions as to reasonable average income for all farm families	5,370	4,455	ns
Average opportunity salary to move farmers off the farm	9,026	8,355	ns

\* - significant at the .10 level of probability  
 ns - nonsignificant at the .05 and .10 levels of probability

The results of the three questions concerning above-average family incomes were also summarized to see if any consistencies arose as to the manner in which each of the innovation categories responded to the various questions. It was discovered that a consistent trend was established in the estimations regarding the amount of gross income necessary to support the net income listed. The innovators' and limitational innovators' estimates represented a relatively liberal approach and were consistent with each other while the non innovator was consistently the most conservative in his estimates. Table 54 represents the summary of the analysis.

Table 54. Opinions concerning average gross and net incomes necessary for varying standards of living.

Question	Innovator		Limitational Innovator		Non Innovator					
	: Gross : : income : : required :	% net : : is of : : gross :	: Gross : : income : : required :	% net : : is of : : gross :	: Gross : : income : : required :	% net : : is of : : gross :				
1. How much annual income do you believe an above-average farm family requires?	7,825	31,605	25%	25%	7,207	28,207	25%	6,286	19,857	33%
2. About how much annual income would meet the minimum needs of an above-average farm family?	4,580	24,400	18%	18%	4,773	19,115	25%	4,286	14,714	28%
3. What would be a reasonable average annual income for all farm families?	5,370	22,032	25%	25%	4,347	18,111	25%	4,686	16,071	28%
Total	17,775	78,037	23%	23%	16,327	65,433	25%	15,258	50,642	30%

The exceptionally high quality of farmers included within the sample population did not provide any significant differences surrounding modern family living conveniences. The majority of all the farmers, regardless of their innovation category, possessed an exceptionally high percentage of the recognized modern family accommodations.

In analyzing the 1959 costs of living it was found that the innovators spent approximately \$1,200 to \$1,300 more than the limitational and non innovators. Although not significantly different this amount represents a somewhat higher family living requirement than the other two categories.

Correspondingly, when asked about the amount of income necessary to meet the needs of an above-average farm family the innovator estimated approximately \$600 higher than the limitational innovator and nearly \$1,600 higher than the non innovator.

The analysis of the amount of personal savings and cash on hand also provided a conclusion coherent with the rest of the findings of this section; namely, that the amount of accumulated savings and cash on hand do not differ among innovation categories.

The innovators also appear to be much more secure and entrenched within their present occupation, because it would require an average salary of \$9,000 to induce them into non farm employment. This is \$500 more than the limitational innovators' requirements and \$1,000 over the non innovators' opportunity salary.

It is apparent that the innovator group requires a relatively higher amount of income for family living and possesses a much more liberal attitude toward income and expenses necessary for the operation of today's farm business. The

innovators are also much more secure in their farming operations, and barring any outside influences it appears that this group constitutes the strength and potential of the type of individual who will be supplying the food and fiber for our nation through the highly competitive years to come.

#### SOCIOLOGICAL AND MANAGERIAL CHARACTERISTICS

##### Personal Goals

The farmers were asked how they rated security, stability, more income and freedom as their personal goals. The first choices of each of the three innovation categories yielded the following distribution.

Table 55. Personal goals by innovation categories.

Item	Innovator		Limitational and Non Innovator	
	Total Choices	% of Total	Total Choices	% of Total
Security	4	20	5	24
Stability	2	10	4	19
More Income	7	35	4	19
Freedom	7	35	8	38
Total	20	100	21	100

The innovators rate freedom and more income very highly in terms of personal goals while the combined limitational and non innovators appear more strongly attracted to freedom and security as life's primary objectives.

Based on the results of the preceding analysis it is arbitrarily concluded that the limitational and non innovators possess a conservative personal



philosophy, while the innovator pursues a more liberal approach to the functions and activities of everyday life.

#### Farm Management Characteristics

The universal high quality of the sample population was again illustrated in the area of farm record keeping. Thirty-nine of the 42 outstanding farmers indicated that they kept a farm record book. There were one innovator and two limitational innovators who failed to keep a record book.

On the basis of the high percentage of record books kept by all the farmers, it is concluded that the practice of keeping farm record books does not differ among the three innovation categories of farmers.

#### Factors Contributing to the Improvement of Management Ability

The farmers were asked the question, What were the most important factors in helping you improve your management?. The following table indicates the aids which were listed and their relative distribution by innovation categories.

Table 56. Factors contributing to the improvement of farm management ability by reduced innovation categories.

Item	: Innovator	: Limitational & Non Innovator
Records	5	4
Agricultural college service	7	6
Membership in organizations	5	3
Schooling	3	0
Field days	2	3
Literature	6	8
Observing others	3	3
Experience and work	6	10

$$r_s = 1 - \frac{2 \sum d^2}{N(N^2 - 1)} = .816$$

The Spearman rank correlation test was run with a significant  $r_s$  value of .816 being received. On the basis of this rank correlation test, it can be concluded that there is a significant correlation between the two innovation categories regarding the materials which aid in improving farm management ability. It is also noted that the agricultural college service, experience, printed literature and records appear to be equally important aids to all the farmers regardless of their innovation characteristics and capabilities.

#### Factors Accounting for the Farmers' Accumulations Made in Farming

The farmers were asked to indicate what factors were most influential in accounting for their accumulations made in farming. The following table indicates the factors listed and their relative distribution by innovation categories.

Table 57. Influential factors contributing to the farmers' accumulations made in farming by reduced innovation categories.

Item	: Innovator	: Limitational & Non Innovator
Luck	3	1
Personal traits and abilities	4	7
Financial and economic factors	3	5
Education and training	2	1
Possession of resources (land, machinery, etc.)	5	4
Management ability	6	2
Type of methods used	1	2

$$r_s = 1 - \frac{\sum d^2}{N(N^2-1)} = .393$$

The Spearman rank correlation test was run yielding a nonsignificant  $r_s$  value of .393. On the basis of this rank correlation test it can be concluded that there is no significant correlation between the two innovation categories on the basis of factors contributing to the farmers' accumulations made in the profession of farming.

The innovator rates management ability and possession of resources as of primary importance while the limitational and non innovators attribute their success to personal traits and abilities and financial and economic factors.

#### Alleviation of Risk in the Operation of the Farm Business

The farmers were asked the question, How do you alleviate the effects of risk (weather, price changes, etc.)?. The following table represents the factors which are currently being utilized.

Table 58. Policies used to alleviate the effects of risk in the farming business by reduced innovation categories.

Item	: Innovator	: Limitational & Non Innovator
Reserve of cash	2	5
Reserve of feed	12	14
Diversified farming practices	9	10
Crop insurance	1	5
Borrow less than otherwise	4	3
Other	4	4

$$r_s = 1 - \frac{b \sum d^2}{N(N^2-1)} = .514$$

The Spearman rank correlation test was run and yielded a nonsignificant  $r_s$  value of .514. It is concluded that there is no significant correlation between the two innovation categories on the basis of items used to lessen the risk elements involved in the farming business. It should be noted that a reserve of feed and diversified farming practices rank as the two most important methods for both innovation categories.

#### Reasons for Adopting New Farming Innovations

The farmers were asked the reasons why they adopted new innovations in the business of farming with the following reasons being listed.

Table 59. Reasons for the adoption of new farm production innovations by reduced innovation categories.

Item	: Innovator	: Limitational & Non Innovator
Cost conscious	2	0
Volume conscious	9	15
Labor conscious	2	1
Efficiency conscious	5	4
Cited everything	2	2

$$r_s = 1 - \frac{b \sum d^2}{N(N^2 - 1)} = .90$$

The Spearman rank correlation test was again employed and yielded a significant  $r_s$  value of .90. It is concluded that there is a significant correlation between the two innovation categories concerning the reasons why they adopt new innovations. It is also interesting to note that both groups unanimously indicated reasons which denoted volume and efficiency characteristics.

It is apparent that this group of farmers adopts new innovations in farm production practices primarily to increase the output and size of business. The philosophy of keeping production costs to a minimum was mentioned a sufficient number of times to rank second in importance.

#### Desires and Anticipations of Future Farm Production Practices by Innovation Categories

The entire study population was analyzed to see if there were any consistent trends or differences among the three innovation categories concerning their desires or dreams for the future operation of their farm business as compared to what they realistically anticipated they would have in the future.

It was found that the innovators consistently had a smaller difference between their estimate of what they would like to have as compared to what they actually thought they would have in the future.

The innovators do have desires to manage larger acreages and livestock enterprises than they realistically feel they will have in the future, but the size of this difference is considerably smaller than that of the limitational and non innovator.

It is concluded that the innovator possesses a more realistic and confident attitude toward the future operation of his farm business than the limitational and non innovator. The innovator knows his desires for the future and possesses the confidence and security which assure him that he will obtain a high percentage of his desired future possessions.

Table 60. Desires and anticipations of future farm production practices by innovation categories.

Item	Innovator		Limitational Innovator		Non Innovator				
	Would like	Likely	Would like	Likely	Would like	Likely			
	to have	to have	to have	to have	to have	to have			
Con't. wheat (acres)	331	268	63	278	241	37	324	241	83
Fallow wheat (acres)	22	8	14	273	155	118	58	77	-19
Grain sorghum (acres)	230	224	6	148	142	6	97	76	21
Forage sorghum (acres)	60	57	3	29	37	-8	23	19	4
Total	643	557	86	728	575	153	502	413	89
Beef cows	71	96	-25	35	53	-18	—	—	—
Sows	12	15	-3	4	7	-3	11	11	0
Wintered steers	28	26	2	51	29	22	100	75	25
Winter, grass and fullfed steers and heifers	72	61	11	21	0	21	20	38	-18
Total	183	198	-15	111	89	22	131	124	7

Before concluding this section attention should be drawn to the trends in total land acreages and total livestock numbers which were established in the preceding table. The limitational innovator thought in terms of larger total amounts of cropland acres while the innovator showed considerably more interest in total number of livestock units. These trends are in agreement with the conclusions established in the preceding land and livestock sections.

## Review and Conclusions

The sociological and managerial characteristics provide a number of interesting insights into the apparent similarities and differences existing within the three innovation categories which pertain to personal goals and principles involved in the management of the farm business.

In the area of personal goals, it appears that the innovator is interested in freedom and more income while the limitational and non innovators concern themselves primarily with freedom and security. It is not possible to draw a definite conclusion from the small amount of data available in this area, but this preliminary analysis indicates a conservative philosophy on the part of the non innovator while the innovators and limitational innovators pursue a more liberal approach in the solution of their problems.

It was found that the entire population of farmers kept record books regardless of their innovation characteristics. Record keeping is such a well accepted farm management practice among the outstanding farmers that no test for significant differences was applied to the three innovation categories.

In the area of factors contributing to the improvement of management ability, it was found that a significant correlation existed between the innovators and limitational and non innovators. The two groups were also in agreement that agricultural college service, experience, printed literature and farm records were the most important factors contributing to the improvement of their farm management ability.

Although no significant correlation existed between the innovation categories on methods used to alleviate the hazard of risk in the operation of

the farm business, both groups unanimously selected a reserve of feed and diversified farming practices as their most commonly employed methods.

A significant correlation was found between the two innovation categories in reasons why they adopt new farm production innovations. Both groups cited the interest in increasing the volume of output and size of business as their first choice and keeping production costs to a minimum as second.

The analysis designed to establish differences between the farmers' desires or dreams for the future operation of their farm business as compared to their realistic anticipations indicated that the innovators consistently had the lesser amount of differences in the crops and livestock sections examined.

It is concluded that the innovator possesses a more sound and confident attitude toward the future operation of the farm business as opposed to the limitational and non innovator.

#### THE FUTURE OF AGRICULTURE IN RICE COUNTY

The national trend in the agricultural segment of the economy has been toward the continual reduction of farm numbers and an increase in the size of the remaining farms. This movement is not only national in scope but it also applies to the local level which includes the confines of Rice county.

In 1954 there were 1155 farmers in Rice county and today the farm population includes only 982 farmers.<sup>25</sup> This trend has been occurring over the past twenty-five years and all indications imply that this movement will continue in the future. Some farmers view this trend as favorable while others cite

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<sup>25</sup>United States Census of Agriculture 1954, p. 16.



numerous aesthetic and cultural values surrounding farm life and proclaim that more people should be given the opportunity to enjoy this environment. These two viewpoints obviously contradict one another; the one taking a recognized realistic approach to the problem, the other obscuring reality with aesthetic dreams of the wholesome superiority of rural life.

The innovation categories were analyzed and tested concerning their personal opinions as to favorability or unfavorability to this trend in decreasing farm numbers. Tables 61 and 62 indicate the results of the tests.

Table 61. Analysis of variance and F-test of significance concerning the trend in the reduction of farm numbers by innovation categories.

Item	:Limitational:			:
	:Innovator	:Innovator	: Non Innovator:	
	: Average	: Average	: Average	: Significance
Opinions as to the number of farmers there will be in Rice county in 1970	805	805	893	ns
Opinions as to number of farmers there should be in Rice county in 1970	835	874	1142	**

\*\* - significant at the .05 level of probability

ns - nonsignificant at the .05 and .10 levels of probability

Table 62. Summary of the analysis of variance and F-test of significance among innovation categories concerning the number of farmers there should be in Rice county in 1970.

Item	: :Innovator : Average	:Limitational: : Innovator : Average	: : Non Innovator : Average	: : Significance
	Innovator vs Limita- tional Innovator	835	874	
Innovator vs Non Innovator	835		1142	**
Limitational Inno- vator vs Non Innovator		874	1142	**

\*\* - significant at the .05 level of probability

ns - nonsignificant at the .05 and .10 levels of probability

Table 61 indicates that there were no significant differences of opinion among the three innovation categories concerning the number of farmers there will be in Rice county in 1970, but a significant difference of opinion was found concerning the number of farmers there should be in Rice county in 1970.

The question of how many farmers there should be in Rice county in 1970 involved the personal value judgment, consequently wider variations in the estimates were found. The test of significance resulted in a significant difference among the three groups. A closer analysis revealed no significant difference of opinion between the innovator and limitational innovator, but significant differences were found between the innovator and non innovator and the limitational innovator and non innovator.

It is concluded that the innovator and limitational innovator realistically recognize the favorability of reducing existing farm numbers while the non innovator continues to weigh heavily the aesthetic desirability of rural life for more people.

Table 62 indicates that all three innovation categories felt there should be more farmers in 1970 than there actually will be. The essential differences lie in the amount of deviation among the groups' opinions. The innovators felt there should be 30 more farmers than there will be, the limitational innovators 69 and the non innovators 249.

The farmers were also asked, Is the movement away from agriculture desirable or undesirable on the local level?. The chi-square test of independence was employed to discover whether any statistical differences occurred between the ratios of desirability and undesirability between the two groups.

Table 63. Chi-square test of independence concerning the relative desirability and undesirability of diminishing farm numbers by reduced innovation categories.

Item	Innovator	Limitational & Non Innovator
Desirable	8	6
Undesirable	12	15
Total	20	21

$$\chi^2 = \sum \frac{(O-E)^2}{E} = .60 \quad \alpha = .05$$

O - observed frequency

E - expected frequency

The chi-square test indicated no significant difference in the ratios between the two innovation categories, however it is interesting to note that 40% of the innovators felt favorable toward the movement while only 29% of the limitational and non innovators deemed the movement desirable.

It is concluded that the innovator and limitational innovator take a more realistic approach to the movement of people out of agriculture and they feel that this trend, while not all together desirable, is necessary. The innovator and limitational innovator feel that there should be approximately 850 farmers in Rice county, which is a reduction of 132 from the 1960 population. The non innovator appears to be much more opposed to this movement and feels that there should be 1142 farmers in Rice county in 1970, which is an increase of 160 over the 1960 population.

As far as desirability of the movement of farmers out of agriculture is concerned both groups have mixed emotions, but a larger percentage of the innovators deem it desirable over the limitational and non innovators.

#### COMPARISON OF THE INNOVATOR WITH THE GENERAL FARMER

This concluding section was designed to indicate the differences which are prevalent between the innovators who were analyzed in this study and the average or general farmer found in Rice county.

It was found that the innovator was significantly younger in chronological age, possessed a significantly higher formal education and had been farming a significantly shorter period of time than the general farmer. The land analysis revealed that the innovator owned and rented a significantly greater acreage of pasture than the general farmer. The cropland analysis denoted no significant differences in the amount of cropland owned, but it was found that the innovator rented a significantly larger acreage of cropland than the general farmer. The innovator also received significantly larger yields from continuous and summer fallow wheat while the two groups received essentially the same

yields from grain sorghum and forage sorghum.

The inferences from this analysis indicate that the innovator has obviously reached a higher level of success at an earlier age than the general farmer.

Table 64. Summary of the analysis of variance and F-test of significance for selected items between Innovators and General Farmers.

Item	: Innovator : : Average :	General Farmer : : Average :	: Significance
Chronological age	41	50	*
Years of education completed by the head of the household	14	11	*
Number of years the farmer has been farming	17	25	**
Acres of cropland owned	284	136	ns
Acres of cropland rented	471	291	*
Acres of pasture owned	179	58	**
Acres of pasture rented	186	68	*
Con't. wheat yields (bu/acre)	23	20	**
Summer fallow wheat yields (bu/acre)	32	26	**
Grain sorghum yields (bu/acre)	38	39	ns
Forage sorghum yields (tons/acre)	12	11	ns

\* - significant at the .01 level of probability

\*\* - significant at the .05 level of probability

ns - nonsignificant at the .05 or .10 levels of probability

## GENERAL SUMMARY

The rapid technological development of American agriculture, particularly over the past decade has made a tremendous contribution to the social and economic status of the American population. Everyone is aware of the tangible dividends of technological innovation which have raised the United States standard of living to heights far distant from that found in any other organized society in the world today, but how many realize the wealth of information which has been unveiled to the socioeconomic researcher as the agricultural population has and is currently adjusting to the new era. Numerous social, economical and psychological variables influence the types of adjustments which occur and account for the differential rate of adjustment by various individuals.

This study has attempted to analyze the socioeconomic characteristics and differences among a group of outstanding farmers who differ in their farm production innovation acceptability while attempting to hold all other variables constant. This, of course, is a difficult, if not an impossible, task and it is recognized that the numerous variables have inadvertently crept into the analysis.

The nucleus of the following summary hinges on social and economic variables surrounding the origin of innovation or early acceptance as so ably described by Schumpeter, "Some people, then, conceive and work out with varying promptness plans for innovations associated with varying (and ideally correct) anticipations of profits, and set about struggling with the obstacles incident to doing a new and unfamiliar thing."<sup>26</sup>

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<sup>26</sup>Solo, loc. cit.

The analysis of the three groups of farmers who varied in the promptness with which they accepted new innovations revealed the following characteristics and trends. The innovators tended to be younger in chronological age, possessed a greater amount of formal education and had fewer years of tenure in the farming profession. All three groups of farmers began their careers by managing essentially the same types of diversified farms, but their operations at the present time indicate that the innovator has recognized the importance of livestock programs as a complement to cash crops much more rapidly than the other categories. A number of the limitational and non innovators still operate cash crop and general diversified farms. The tenure status of their farms indicated that the majority of the entire study population were renters. Land ownership was not significantly affiliated with any particular innovation group and it was noted that there was a trend away from interest in land ownership on the part of all the respondents in the study.

The limitational innovator managed a larger land unit than the other categories, and if his plans for the future materialize in a manner coherent with his anticipations, the limitational innovator will continue to manage a larger land unit in 1970. The limitational innovator also demonstrated a greater interest in acquiring more acres of cropland than the other two innovation groups. Ownership of more acres of pastureland did not significantly interest any of the innovation categories. While the limitational and non innovator groups indicated some increases in their desires to own more land by 1970, it should be noted that the innovator group did not anticipate purchasing any more cropland, and was willing to sell a sizable acreage of its pastureland. The innovator also demonstrated much more critical evaluation and appraisal standards when asked to judge the quality of his owned cropland and pastureland.

No significant differences were found among the three innovation groups concerning the average yields received and average yields anticipated in the future in the production of continuous wheat, fallow wheat, grain sorghum and forage sorghum. It should be noted, however, that the innovators and limitational innovators consistently maintained a higher current and anticipated average in three of the four crops considered. In terms of overall optimism concerning yields expected in the future, the limitational innovator was the most optimistic followed in order by the innovator and non innovator. It was also found that the innovators used more commercial fertilizer and insecticides and planted a greater proportion of strong milling varieties of wheat than the limitational and non innovators.

The livestock analyses indicated that the innovators managed a significantly larger number of total animal units than the limitational and non innovators for 1955, 1957 and 1959. It was impossible to identify any livestock programs characteristic to different innovation categories, but it was noted that a continual reduction occurred in the number of beef cow herd, dairy and poultry enterprises located within the study population. The livestock enterprises showing the largest gain in number of head per farm were beef cattle feeding, hogs and poultry.

The area of analysis concerning family living standards indicated no significant differences among the innovation groups concerning the possession of modern family living conveniences. It was discovered that the innovators demanded a consistently larger amount of income for family living. No significant differences were found among the innovation groups concerning their possession of accumulated savings and cash on hand.



The innovators are much more content and secure in their present occupations as indicated by the considerably larger opportunity salary necessary to attract them into off-farm employment.

In analyzing the equity of the farm business it was found that the innovator consistently possessed larger accumulations of total assets, greater amounts of total debts and a higher resulting net worth than the limitational and non innovators.

The income analyses indicated that the innovator group consistently received larger amounts of gross and net farm income than the limitational and non innovators. The primary reason for the obvious differences in income can be attributed to the sale of livestock, where the innovators consistently received larger incomes from the sale of red meat, milk and eggs. The limitational and non innovators did receive a slightly larger income from the sale of crops, but this increase was not sufficient to offset the large difference resulting from livestock receipts.

The analyses of business expenditures indicated that limitational and non innovators paid out more for cash rent, hired machinery and trucking, and insurance while the innovator spent larger sums for interest and hired labor.

The psychological analyses indicated that the innovators rated freedom and more income very highly in terms of personal goals while the limitational and non innovators appeared more strongly attached to freedom and security.

Farm management practices did not differ significantly among the three innovation groups. The majority of the population kept a farm record book and they were all in close agreement as to aids which were useful in improving management ability and alleviating the hazards of risk in the operation of

the farm business. The three groups also agreed that the primary reason they adopted new farm production innovations was to increase the volume of output and size of business, and to keep production costs to a minimum.

The analyses designed to establish differences between the farmers' desires or dreams for the future operation of their farm business as compared to their realistic anticipations indicated that the innovators consistently had the least amount of differences in the various crop and livestock situations which were examined. It was concluded that the innovator possesses a more realistic attitude toward the future operation of his farm business, and possesses a sounder and more confident attitude toward the future organization of the farm business as opposed to the limitational and non innovator.

In analyzing the future of agriculture in Rice county, it was found that the innovation categories differed in their opinions as to the number of farmers there will be as compared to the number there should be in Rice county in 1970. The three groups of farmers were in agreement regarding the average number of farmers there will be in Rice county in 1970, but a significant difference was found when the groups estimated the number of farmers there should be in Rice county in 1970. The innovator and limitational innovator agree that there should be fewer farmers in the future while the non innovator feels that a larger farm population is a necessity.

#### GENERAL CONCLUSIONS

It was found that the innovator was younger in chronological age, had more formalized education, and had less experience in the farming profession than the limitational and non innovator. This is important, for the obvious differences found among the study population illustrate the new ideas and practices which have been put forth by the innovator category. Obviously

the innovator with his youngness in age, his stronger educational background and his lack of experience in settling into a traditional routine has been provided with a strong motivation to try new methods. The results and relative merits of this motivation are evident in the following conclusions.

The first practice which was contrary to the traditional method of farming was found in the cropland analysis. The innovator did not manage the largest acreages of cropland and did not produce the greatest quantities of grains and forages. The innovator actually managed an average of 125 acres less than the limitational and non innovator, but he did intensify and increase the volume of his business by managing larger numbers of livestock. The innovator continually managed twice as many animal units as the limitational and non innovator.

The innovator is aware and has experienced that grains and roughages when marketed through livestock can provide a larger return to the factors of production than when sold on a cash basis. It is important to note that on the average the innovator sacrifices an average of 125 acres of cropland for approximately 100 animal units. This is significant for the innovator feels one animal unit will provide more income than one acre of land planted to any of the commonly grown forage and grain crops.

The pastureland acreage analysis indicates that the innovators are managing approximately 200 acres more of pastureland than the limitational and non innovators. This follows, for the innovators also managed more animal units. In analyzing the average carrying capacities it was found that the non innovators averaged 2.6 acres/animal unit, the innovators 3.0 acres/animal unit and the limitational innovators 4.0 acres/animal unit. The non innovator has a tendency to overgraze his native pasture while the innovator and limitational innovators are more liberal in their grass

allowance. The average carrying capacity for good native pasture in south central Kansas is 3-4 acres/animal unit.

The innovator also managed an average of \$35,000 more assets and carried an average level of indebtedness of about \$15,000 more than the limitational and non innovator. This is significant for the innovator realizes the importance of credit in maintaining a sufficient farm size. In 1960 total debts were 19% of the innovator's total assets as compared to 9% for the limitational and non innovator, but by 1970 the innovator estimates that total debts will be 8% (a reduction of 11% from 1960) compared to approximately 4% (a reduction of 5% from 1960) for the limitational and non innovator.

This is important for the innovator indicates he is approaching what he holds to be his optimum farm organization at a much earlier age in life than the limitational and non innovator. The influence surrounding the innovator reaching his optimum farm organization was substantiated in the land section where it was found that by 1970 the innovator will be willing to sell approximately one-half his owned pastureland and he is not interested in owning any more cropland. It should be noted, however, that the innovator is planning to double the number of animal units on the farm by 1970. Again, the innovator profitably substitutes acres of land for animal units. The innovator is building his farm organization in a vertical fashion through increased livestock numbers rather than in a horizontal manner which involves more acres of land.

The net worth analysis substantiates the previous finding in the total assets and liabilities sections; namely, that the innovator manages a considerably larger net worth than the limitational and non innovator.

In addition to organizing and managing a larger and more intensified agricultural unit, the use of the variable factors of production must also be compared and considered. The variable factors of production which indicate the greatest differences among the innovator categories were labor and machinery investment. The innovator devoted more man hours to the operation of his farm business than the limitational and non innovators. The innovator employed an average of eight months of hired labor while the limitational and non innovator used approximately two months equivalent of hired labor. The use of approximately six more months of hired labor can be explained by the fact that the innovator has expanded his livestock program to the extent that more year-around labor is economically feasible and necessary, and also the innovator feels that the wife should do no outside farm labor. The innovator did not employ his wife in outside farm labor while the combined limitational and non innovators employed their wives 2.5 months per year in actual farm work. The innovator realizes the cost of idle labor thus he has organized livestock programs which will efficiently utilize the normally idle winter months.

The innovator also carries a smaller machinery investment than the limitational innovator. By sacrificing approximately 125 acres of land the innovator can properly operate with an average of \$2,500 less machinery investment. Some of his machinery is used on a year-around basis with livestock programs which reduces the per unit costs.

The innovator farms less cropland but the average yield analysis indicates that the innovator consistently averages 2-3 bushels more of wheat per acre and an average of one ton more of forage sorghum silage per acre than the limitational and non innovators. The limitational and non innovators do, however, realize approximately five more bushels per acre of grain

sorghum than the innovators. The innovator has intensified his production practices and receives higher bushel per acre yields from fewer acres than lower yields from larger acreages.

The higher yields per acre enjoyed by the innovator can be explained partially by the use of fertilizer and insecticides. The innovator consistently spent larger amounts for fertilizer on grain sorghum, forage sorghum and continuous wheat while the non innovator spent a significantly larger amount for fertilizer on fallow wheat. The innovator also spent a larger amount on insecticides for all crops.

The consistently higher average yields enjoyed by the innovator have also afforded him a much more optimistic attitude concerning the future than the limitational and non innovator. When asked to estimate what the average expected yields would be in the future, the innovator consistently averaged a 2-3 bushel higher estimate than the limitational and non innovator.

The conclusions thus far have indicated two different philosophies on the part of the study clientele; the innovators moving in a vertical expansion method in which they are primarily interested in intensifying their existing farm business through more livestock and holding their cropland acreages steady, while the limitational and non innovators are interested in a horizontal expansion plan where land expansion takes precedence over increasing livestock numbers. The following income analysis compares the relative monetary merits of these two divergent philosophies. It is immediately apparent by the gross farm income returns that the innovators have received significantly larger amounts of gross income than the limitational and non innovators. A closer analysis revealed that gross receipts from the sale of livestock was the primary factor giving the innovator an average of \$10,000 more gross income in 1959 than the limitational and non innovator.

The innovator sold \$8,000 more animal units than the combined limitational and non innovators.

The limitational and non innovators had a slightly higher average income from crops but the innovator sold more other farm produce and had a slightly higher amount of other farm income.

This analysis indicates that the farmer with adequate management ability who intensifies his production practices through livestock enterprises complementary to his crop production plan can improve his income structure. It is also apparent that livestock can serve to significantly increase the farmer's income.

The innovators placed a higher value on their professional skills and competencies and spent significantly larger amounts for family living than the limitational and non innovators. The innovator spent approximately \$1,500 more per year on family living than the limitational and non innovators. This follows also, for the innovator is receiving a significantly larger return for his management ability and can afford to live more luxuriously.

Correspondingly, when asked to estimate the average incomes which would be satisfactory for other farm families the innovator consistently gave the higher and more liberal estimate. The innovator also values his abilities at \$700 more per year than the limitational and non innovator if he were afforded the opportunity to work in off-farm employment. The innovator indicated that it would take an average salary of \$9,000 per year to lure him into off-farm employment. This is significant for it is evident that the innovator places a higher value on his management capabilities than the limitational and non innovator.

The innovator has benefited greatly from his interested and receptive attitude toward change. This farmer recognizes the importance of change and realizes the monetary benefits which can be gained by keeping an eye to the future and properly assessing alternatives and competitive advantages which arise. The innovator realizes the importance of keeping ahead of his highly competitive neighbors but of equal importance is his sound judgment and managerial ability. The innovator recognizes the importance of operating a farm business with sizable volume, and he has built up the necessary volume through enterprises complementary to his present cropping program.

The innovator is truly the farmer of tomorrow and it is this type of interest, attitude and awareness toward future changes which will keep the farmer in business through the highly competitive years to come.

The results of this study substantiate the majority of the findings of the Interstate Managerial Survey and the Beal and Bohlen sociological studies which have also investigated the economic and sociological characteristics of farmers who differ in their rates of acceptability of new farm production innovations.

It should be noted, however, that this study has dealt with a unique, specially selected group of farmers who were recognized for their outstanding capabilities in the farming profession while the Interstate Managerial Survey and the Beal and Bohlen sociological studies dealt with a random sample method of analysis.

It is felt that in order to gain a more meaningful perception of the future of agriculture and to establish characteristics of the successful farmer of tomorrow, the outstanding farmer of today must be considered. The differences found among the outstanding farmers of today will be the primary



determinants influencing which farmers will be producing the food and fiber through the highly competitive future years to come.

The results of this study conflict with the findings of the Interstate Managerial Survey primarily in two areas: correlation between farm size (acres) and innovation, and correlation between the amount of debts and innovation.<sup>27</sup>

The Interstate Managerial survey concluded that as the size of farm (acres in crops and rotation pasture) increased the proportion of respondents classified as innovators increased, while this study concluded that farmers rated lower in innovation acceptability managed larger acreages and the more highly indoctrinated innovators managed fewer acres but made more economical use of their resources through the use of complementary livestock programs.<sup>28</sup>

Also contrary to the findings of the Interstate Managerial survey which concluded that no relationship existed between the amount of total debts and innovation, this study found the innovators consistently carrying a considerably larger proportion of total liabilities than those borne by the remaining innovation categories under study.<sup>29</sup>

Table 65. General summary of the analysis of variance and F-test of significance for all tests conducted within the study by innovation categories.

Item	:Limitational:		: Non Innovator:	: Significance
	: Innovator	: Innovator		
	: Average	: Average	: Average	
Average age (years)	41.05	43.26	48.00	ns-25
Average years of formal education completed by head of household	14.00	13.46	13.00	ns

<sup>27</sup>Hildebrand, loc. cit.

<sup>28</sup>Loc. cit.

<sup>29</sup>Loc. cit.

Table 65. (cont.)

Item	: Limitational:			:
	: Innovator:	: Innovator:	: Non Innovator:	
	: Average :	: Average :	: Average :	: Significance
Length of farm tenure (years)	17.15	19.86	26.57	ns-25
Average cropland owned (acres)	284	292	197	ns
Average cropland rented (acres)	471	736	356	*
Average total cropland managed (acres)	755	1028	553	ns-25
Average cropland they expect to own by 1970 (acres)	284	427	222	ns
Average cropland which should be returned to grass (acres)	230	64	51	ns
Average pastureland owned (acres)	179	62	43	ns
Average pastureland rented (acres)	186	123	80	ns
Average pastureland managed (acres)	365	185	123	ns
Average pastureland they expect to own by 1970 (acres)	63	66	53	ns
Average yields received:				
Grain sorghum (bu/acre)	38	39	46	ns-25
Forage sorghum (tons/acre)	12	11	12	ns
Continuous wheat (bu/acre)	23	21	22	ns
Fallow wheat (bu/acre)	32	27	28	ns

Table 65. (cont.)

Item	: Limitational:			: Significance
	: Innovator:	: Innovator:	: Non Innovator:	
	: Average :	: Average :	: Average :	
Average yields expected:				
Grain sorghum (bu/acre)	48	51	59	ns
Forage sorghum (tons/acre)	15	14	12	ns
Continuous wheat (bu/acre)	27	26	25	ns
Fallow wheat (bu/acre)	35	34	30	ns
Dollars/acre spent for fertilizer on grain sorghum	1.49	.82	.27	ns-25
Dollars/acre spent for fertilizer on forage sorghum	1.84	.80	0	ns
Dollars/acre spent for fertilizer on continuous wheat	3.70	3.24	3.12	ns
Dollars/acre spent for fertilizer on fallow wheat	.86	.22	2.37	*
Dollars/acre spent for use of insecticides on all crops	60.00	53.00	29.00	ns
Number of animal units-1955	108	34	63	**
Number of animal units-1957	104	37	55	**
Number of animal units-1959	124	49	51	**
Number of animal units-1970	210	81	146	*

Table 65. (concl.)

Item	: Limitational:			: Significance
	: Innovator:	: Innovator	: Non Innovator:	
	: Average :	: Average :	: Average :	
Average machinery investment - 1959 (dollars)	18,193	20,564	14,562	ns
Average living costs-1959 (dollars)	4,529	3,329	3,214	ns-25
Opinions as to average annual income necessary to meet the needs of an above-average farm family (dollars)	7,825	7,207	6,286	ns
Opinions as to average annual income necessary to meet minimum needs of an above-average farm family (dollars)	4,580	4,773	4,286	ns
Opinions as to reasonable average income for all farm families (dollars)	5,370	4,347	4,686	ns
Average opportunity salary to move farmer off the farm (dollars)	9,026	8,500	8,017	ns
Opinions as to the number of farmers there will be in Rice county in 1970	805	805	893	ns
Opinions as to number of farmers there should be in Rice county in 1970	835	874	1,142	**

\* - significant at the .10 level of probability

\*\* - significant at the .05 level of probability

ns - nonsignificant at the .05, .10 and .25 levels of probability

ns-25 - nonsignificant at the .05 and .10 levels of probability but significant at the .25 level of probability

Table 66. General summary of the analysis of variance and F-test of significance and the Mann-Whitney T-test of significance for all tests conducted within the study by reduced innovation categories.

Item	: :Innovator	: Limitational and : Non Innovator	Significance
	: Average	: Average	
Average age (years)	41.05	44.77	ns-25
Average years of formal education completed by head of household	14.00	13.31	ns-25
Length of farm tenure (years)	17.15	22.00	ns-25
Average cropland owned (acres)	284	262	ns
Average cropland rented (acres)	471	615	ns
Average total cropland managed (acres)	755	877	ns
Average cropland they expect to own by 1970 (acres)	284	361	ns
Average cropland which should be retired to grass (acres)	230	61	ns-25
Average pastureland owned (acres)	179	57	ns
Average pastureland rented (acres)	186	112	ns-25
Average pastureland managed (acres)	365	169	ns-25
Average pastureland they expect to own by 1970 (acres)	63	61	ns
Dollars/acre spent for fertilizer on grain sorghum	1.49	.64	*

Table 66. (cont.)

Item	: :Innovator : Average	Limitational and Non Innovator Average	: : :	Significance
Dollars/acre spent for fertilizer on forage sorghum	1.84	.62		ns-25
Dollars/acre spent for fertilizer on continuous wheat	3.70	3.20		ns
Dollars/acre spent for fertilizer on fallow wheat	.86	.79		ns
Dollars/acre spent for use of insecticides on all crops	60.00	46.00		ns
Number of animal units-1955	108	43		**
Number of animal units-1957	104	42		**
Number of animal units-1959	124	50		**
Number of animal units-1970	210	101		**
Total assets - 1960 (dollars)	111,027	75,391		ns-25
Total assets - 1970 (dollars)	137,075	86,800		ns
Total liabilities - 1960 (dollars)	20,830	6,905		**
Total liabilities - 1970 (dollars)	11,450	5,025		ns
Net worth - 1960 (dollars)	90,197	68,486		ns-25
Net worth - 1970 (dollars)	125,625	81,775		ns

Table 66. (cont.)

Item	: Limitational and :		Significance
	: Innovator : Average	: Non Innovator : Average	
Gross receipts from sale of livestock- 1955 (dollars)	7,381	3,535	**
Gross receipts from sale of livestock- 1957 (dollars)	6,148	2,881	ns-25
Gross receipts from sale of livestock- 1959 (dollars)	12,363	4,271	**
Gross receipts from sale of crops- 1955 (dollars)	7,328	8,178	ns
Gross receipts from sale of crops- 1957 (dollars)	5,560	4,737	ns-25
Gross receipts from sale of crops- 1959 (dollars)	9,393	9,534	ns
Gross receipts from sale of other farm produce-1955 (dollars)	1,565	1,003	ns
Gross receipts from sale of other farm produce-1957 (dollars)	2,466	489	ns
Gross receipts from sale of other farm produce-1959 (dollars)	1,858	396	ns
Other farm income 1955 (dollars)	1,622	1,098	ns
Other farm income- 1957 (dollars)	2,305	2,717	ns-25
Other farm income- 1959 (dollars)	1,653	1,079	ns

Table 66. (cont.)

Item	: :Innovator : Average	: : Limitational and : Non Innovator : Average	: : :	Significance
Gross farm income- 1955 (dollars)	17,896	13,815		ns
Gross farm income- 1957 (dollars)	16,479	10,824		**
Gross farm income- 1959 (dollars)	25,267	15,281		**
Net farm income- 1955 (dollars)	4,159	3,413		ns
Net farm income- 1957 (dollars)	3,015	1,405		**
Net farm income- 1959 (dollars)	5,074	3,231		ns-25
Amounts paid out for cash rent-1955 (dollars)	632	602		ns
Amounts paid out for cash rent-1957 (dollars)	289	545		ns-25
Amounts paid out for cash rent-1959 (dollars)	424	654		ns
Amounts paid out for depreciation-1955 (dollars)	3,182	2,195		ns
Amounts paid out for depreciation-1957 (dollars)	2,832	1,842		*
Amounts paid out for depreciation-1959 (dollars)	3,917	2,314		*
Amounts paid out for insurance-1955 (dollars)	109	226		ns-25



Table 66. (cont.)

Item	: :Innovator : Average	: : Limitational and : Non Innovator : Average	Significance
Amounts paid out for insurance-1957 (dollars)	85	260	*
Amounts paid out for insurance-1959 (dollars)	170	224	ns
Amounts paid out for hired machinery and trucking-1955 (dollars)	254	377	ns
Amounts paid out for hired machinery and trucking-1957 (dollars)	455	580	ns
Amounts paid out for hired machinery and trucking-1959 (dollars)	454	614	ns
Amounts paid out for interest-1955 (dollars)	348	156	ns
Amounts paid out for interest-1957 (dollars)	297	289	ns
Amounts paid out for interest-1959 (dollars)	1,220	544	ns-25
Amounts paid out for hired labor-1955 (dollars)	886	577	ns-25
Amounts paid out for hired labor-1957 (dollars)	1,143	439	**
Amounts paid out for hired labor-1959 (dollars)	1,795	490	**
Average living costs-1959 (dollars)	4,529	3,290	*

Table 66. (concl.)

Item	: : <u>Innovator</u> : Average	: : <u>Limitational and</u> : <u>Non Innovator</u> : Average	: :	Significance
	Opinions as to average annual income necessary to meet the needs of an above-average farm family (dollars)	7,825	6,914	
Opinions as to average annual income necessary to meet minimum needs of an above-average farm family (dollars)	4,580	4,618		ns
Opinions as to reasonable average income for all farm families (dollars)	5,370	4,455		ns-25
Average opportunity salary to move farmer off the farm (dollars)	9,026	8,355		ns

\* - significant at the .10 level of probability

\*\* - significant at the .05 level of probability

ns - nonsignificant at the .05, .10 and .25 levels of probability

ns-25 - nonsignificant at the .05 and .10 levels of probability but significant at the .25 level of probability

## ACKNOWLEDGMENT

The author wishes to express his sincere appreciation to all who assisted in the preparation of this study. Special recognition is due Mr. R. D. McKinney, Assistant Professor of Agricultural Economics, Kansas State University who served as major professor and provided guidance with many helpful suggestions.

Dr. Stanley Wearden, Department of Statistics, Kansas State University is also recognized for his assistance in the statistical analyses.

Thanks also to the Rural Economic Development staff who devoted considerable time and effort in assisting the author with the compilation and tabulation of the research data used in this analysis.

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## APPENDICES

Appendix A. The questionnaires used to interview the study population.

## RURAL ECONOMIC DEVELOPMENT RESEARCH PROJECT, 1960

KANSAS STATE UNIVERSITY  
 Kansas Extension Service and  
 the Experiment Station

Farm Schedule \_\_\_\_\_  
 Date \_\_\_\_\_  
 Enumerator \_\_\_\_\_

1. Do you keep a farm record book? yes \_\_\_ no \_\_\_
  
2. There are about 1050 farmers in Rice county. How many do you believe there will be in 1970? \_\_\_\_\_  
 How many do you believe there should be by 1970? \_\_\_\_\_
  
3. What innovations or changes do you think farmers will adopt in the next 5 to 10 years? \_\_\_\_\_
  
4. Rank the following in importance as your goals. (1,2,3,4)
  - (a) More income \_\_\_\_\_
  - (b) Stability \_\_\_\_\_
  - (c) Security \_\_\_\_\_
  - (d) Freedom \_\_\_\_\_
  
5. Farm families have numerous goals they wish to attain. Based on your family's goals and your knowledge of standards of living levels, in general,
  - (a) How much annual income do you believe an above average farm family requires \$ \_\_\_\_\_
  - (b) How much annual income would meet the minimum need of an above average farm family \$ \_\_\_\_\_
  - (c) What would be a reasonable average annual income for all farm families \$ \_\_\_\_\_
  
6. How much total gross farm income would be necessary to provide the income listed in 5 above, on the average?
  - (a) above, \_\_\_\_\_
  - (b) above, \_\_\_\_\_
  - (c) above, \_\_\_\_\_
  
7. How much yearly salary would have to be offered in an off-the-farm job before you would move, assuming good living conditions, security and self-satisfaction in the new job? \$ \_\_\_\_\_
  
8. We would like some information on your beginning in farming.
  - (1) What year did you start farming on your own? \_\_\_\_\_
  - (2) Where did you start farming? \_\_\_\_\_
  - (3) Type of farm then (cash crop, cash crop--cow herd, cash crop--beef feeding etc.) \_\_\_\_\_
  - (4) Please check the methods which describe the way you started.
    - a. Rented land- - - - - \_\_\_\_\_
    - b. Inheritance- - - - - \_\_\_\_\_
    - c. Purchased land with considerable borrowed money- - - - - \_\_\_\_\_
    - d. Purchased land and rented other land - - - - - \_\_\_\_\_
    - e. Other (specify)- - - - - \_\_\_\_\_

9. We would like some information on your operation for the past five years.  
Please help us fill out the following table:

	1955	1956	1957	1958	1959
<b>Cropland:</b>					
Owned, acres					
Rented, acres					
<b>Pasture Land:</b>					
Owned, acres					
Rented, acres					
<b>Livestock, number of head:</b>					
Beef cows (feeder calf)					
Dairy cows					
Sows					
Beef calf system (describe)					
No. of head					
Ewes					
Hens					
Other (describe)					
No. of head					



10. The following information is needed on your capital (that years market value) structure in the past and present and what you expect it to be by 1970.

	Start Farming Year _____	Year				Future
		1930	1940	1950	1960	1970 (use 1960 value)
<b>Assets:</b>						
Value						
<u>Owned land</u>						
<u>Farm bldgs.</u>						
<u>House</u>						
<u>Machinery &amp; equipment</u>						
<u>Cash on hand</u>						
<u>Value stocks, bonds, other investments</u>						
<u>Money owed to you</u>						
<u>Other assets</u>						
<b>TOTAL</b>						
<b>Debts:</b>						
<u>Real estate</u>						
<u>Debt against machinery or livestock</u>						
<u>Other notes</u>						
<b>TOTAL</b>						
<b>Net Worth</b>						

11. The following information is needed on your farm organization in the past, present and what you expect in the future:

	Start farming	Year			Future	
	Year	1930	1940	1950	1960	1970
<b>LAND:</b>						
Owned						
<u>Crop acres</u>						
<u>Pasture acres</u>						
<u>TOTAL ACRES</u>						
Rented						
<u>Crop acres</u>						
<u>Pasture acres</u>						
<u>TOTAL ACRES</u>						
<b>LIVESTOCK:</b>						
Beef						
<u>Kind of system</u>						
<u>Number of head</u>						
<u>Dairy cows (no.)</u>						
<u>Sows (no. of head)</u>						
<u>Hens (no.)</u>						
<u>Ewes (no.)</u>						
<b>CROPS: (acres)</b>						
<u>Continuous wheat</u>						
<u>Wheat after fallow</u>						
<u>Grain sorghum</u>						
<u>Sorghum for</u>						
<u>silage or forage</u>						
<b>MACHINERY:</b>						
Tractors						
<u>Size (plows)</u>						
Combines						
P - pull or						
S - self-prop.						
<u>&amp; size in feet</u>						
<b>LABOR:</b>						
No. men						
<u>(equivalent concert)</u>						
<b>INCOME:</b>						
<u>Net from farming</u>						
<u>Outside</u>						
<b>LIVING COSTS:</b>						

12. Have you ever time used more and better machinery? yes \_\_\_ no \_\_\_  
 If yes, what has enabled you to do this and why did you do it? \_\_\_\_\_

13. We would like to talk with you about some of your plans and the difficulties in carrying them out. We would like to get your thoughts both on what you would like to do and what you probably will be able to do.

Would you like to farm more land?

No . . . . . \_\_\_\_\_

(If checked, ask questions below)

Reasons for not wanting more land to farm

1. Shortage of labor, I plan to work some at non-farm job \_\_\_\_\_
2. Shortage of labor \_\_\_\_\_
3. Age \_\_\_\_\_
4. Not enough machinery \_\_\_\_\_
5. Am now farming all I can in a timely fashion \_\_\_\_\_
6. Farming more land would not be profitable \_\_\_\_\_
7. Too risky \_\_\_\_\_
8. Other (specify) \_\_\_\_\_

Yes. . . . . \_\_\_\_\_

(If checked, ask questions below)

- (1) Would you like to rent more land? yes \_\_\_ no \_\_\_

If yes, answer the following questions

How many acres crop \_\_\_\_\_

How many acres pasture \_\_\_\_\_

- a. Are these difficulties to you in renting land?
1. Land for rent not available \_\_\_\_\_
  2. Only poor land for rent \_\_\_\_\_
  3. Land available but landlords share too high \_\_\_\_\_
  4. Land available but leasing arrangements are poor \_\_\_\_\_
  5. Landlords rent only to tenants with large investment in machinery \_\_\_\_\_
  6. Other (specify) \_\_\_\_\_

14. Would you like to purchase more machinery? (Above replacing present machinery as they wear out.) yes \_\_\_ no \_\_\_  
 If yes, describe \_\_\_\_\_

15. We would like the number of months of labor put in for farm work for 1955, 1959, and what you expect for 1970.

	Months of labor (in terms of an adult worker)		
	1955	1959	1970
Operator			
Summer (May, June, July, Aug.)			
Other Months			
Wife			
Summer			
Other Months			
Children			
Summer			
Other Months			
Other Family			
Summer			
Other Months			
Hired Help			
Summer			
Other Months			

16. We have been talking about things you have to work with. We would like for you to tell us how your farm should be organized by 1970.

	Land Operated and Machinery Purchases that you would like	Land Operated and Machinery Purchases that are likely	
	How farm should be organized	How farm should be organized	How farm will be organized
Crops:			
Continuous wheat, acres			
Wheat after fallow, acres			
Grain sorghum, acres			
Sorghum for silage, acres			
Other (specify)			
, acres			
Livestock, no. of head:			
Beef cows, (feeder calf)			
Dairy cows			
Sows			
Beef calf system (describe)			
No. of head			
Ewes			
Hens			
Other (describe)			
No. of head			
No. of head			

17. We would like some information on varieties, fertilizer and weed killer practices you are now using, with yields now, and yields from practices you expect to use in the future.

	With Practices you are using at present					With Practices You Expect To Use	
	Variety	Fertilizer		Weed Killer		Yield on the average per acre	Expected yields, per acre
		Kind	Lbs/acre	Yes	No		
Continuous wheat						bu.	_____ bu.
Wheat after fallow						bu.	_____ bu.
Grain sorghum						bu.	_____ bu.
Sorghum for silage						ton.	_____ ton.
Native pasture						(a) no. (b) acres	(a) no. (b) acres
						per head mature cattle	per head mature cattle
Other (specify)							
_____							
_____							

18. Do you feel that you have progressively improved your management abilities over the years? yes \_\_\_ no \_\_\_  
If yes, what methods have you used to improve your management abilities?  
\_\_\_\_\_
19. How do you account for the advancements and accumulations you have made in farming?  
\_\_\_\_\_
- (a) What were the most important factors?  
\_\_\_\_\_
20. Are the risks associated with weather and price changes difficulties in getting ahead? yes \_\_\_ no \_\_\_  
If yes, how?  
\_\_\_\_\_
- (a) What do you do to alleviate the effects of these risks?
1. Reserve of cash \_\_\_\_\_
  2. Reserve of feed \_\_\_\_\_
  3. Diversify or specialize less than otherwise would \_\_\_\_\_
  4. Crop insurance \_\_\_\_\_
  5. Borrow less than otherwise would \_\_\_\_\_
  6. Other \_\_\_\_\_

21. Why do you adopt new innovations? (For example, fertilizers or weed sprays)
- (a) Lower costs of production \_\_\_\_\_
  - (b) Lighten the work load \_\_\_\_\_
  - (c) Specialize \_\_\_\_\_
  - (d) Increase production \_\_\_\_\_
  - (e) Enlarge business \_\_\_\_\_
  - (f) Other \_\_\_\_\_
22. What recent innovations or changes have you recently adopted and what have been their effects? \_\_\_\_\_  
\_\_\_\_\_
23. What innovations or changes will you make next and what effect do you hope for? \_\_\_\_\_  
\_\_\_\_\_
24. How much did you spend on insecticides last year? \$ \_\_\_\_\_
- (a) Would it have been profitable to you to spend more? yes \_\_\_\_\_ no \_\_\_\_\_
  - (b) If yes, on what crops? \_\_\_\_\_  
\_\_\_\_\_
25. With the organization you expect to have by 1970 and with the practices you expect to use by then, would you expect your income, relative to that for the last 5 years, to be (check one).
- a. About the same \_\_\_\_\_
  - b. Less but not more than 25% less \_\_\_\_\_
  - c. Less and between 25 and 50% less \_\_\_\_\_
  - d. More but not to exceed 25% more \_\_\_\_\_
  - e. More and between 25 and 50% more \_\_\_\_\_
  - f. More and between 50 and 100% more \_\_\_\_\_
  - g. More than 100% more \_\_\_\_\_
  - h. Other (specify) \_\_\_\_\_
26. Which of the following facilities do you have?
- Hot and cold running water in the house \_\_\_\_\_
  - Bathroom in the house including tub or shower \_\_\_\_\_
  - Piano \_\_\_\_\_
  - Automatic or semi-automatic washer, or washer-dryer \_\_\_\_\_
  - Electric sweeper \_\_\_\_\_
  - Electric clock \_\_\_\_\_
  - 1958 model or newer automobile \_\_\_\_\_
  - Central heating system in the house \_\_\_\_\_
  - Outside grill for cooking \_\_\_\_\_
  - Subscriptions to four or more magazines \_\_\_\_\_
  - House exterior of brick, faced stone, stucco, or painted frame \_\_\_\_\_
  - Telephone \_\_\_\_\_
  - Television \_\_\_\_\_

27. Please give us the names of all persons now living in this household.

Now would you please give us the information we need about each of the persons you have named.

Name of persons living in household	Sex (M or F)	Age (years)	Years of formal full-time education	Occupation (see occupational classification guide)	Employment Status (owner-operator, leasor or renter, manager, employee, other)
(1)					
(2)					
(3)					
(4)					
(5)					
(6)					
(7)					

## DO YOU HAVE ANY OF THE FOLLOWING ITEMS?

## Field Crop Machinery:

## Tractor

(1) 2-3 Flow	Yes _____	No _____	How Many _____
(2) 3-4 Flow	Yes _____	No _____	How Many _____
(3) 5-6 Flow	Yes _____	No _____	How Many _____
Corn Head for Combine	Yes _____	No _____	
Hay Conditioner or Crusher	Yes _____	No _____	

## Livestock Feeding:

Automatic Feed Wagon	Yes _____	No _____
Automatic Feed Box on Truck	Yes _____	No _____
Auger in Feed Bunk	Yes _____	No _____
Silo Unloader	Yes _____	No _____
Automatic Feed Mixing Plant (portable or stationary)	Yes _____	No _____

## Grain and Roughage Handling:

Automatic Silage Loader	Yes _____	No _____
Automatic Bale Loader	Yes _____	No _____
Grain Drying System	Yes _____	No _____
Hay Drying System	Yes _____	No _____
Portable Auger	Yes _____	No _____
Hay Wafaring Machinery	Yes _____	No _____

## Livestock Facilities:

Fenceline Feed Bunks	Yes _____	No _____
Confined Hog Feeding Facilities (concrete, self feeders, auto- matic waterers)	Yes _____	No _____
Farrowing Crates	Yes _____	No _____
Bunker Silo	Yes _____	No _____

## Crop Production Practices:

Do you wheel-track plant?	Yes _____	No _____
Do you use pre-emergence herbicides? (simazin- atrazine)	Yes _____	No _____



KANSAS STATE UNIVERSITY  
Kansas Extension Service  
And The Experiment Station

I (we) the undersigned give our permission and a power of attorney to R. D. McKinney, Assistant Professor, Department of Agricultural Economics, Kansas State University, Manhattan, Kansas, for the purpose of obtaining our income and expenses as filed with the State of Kansas Income Tax Division, State Office Building, Topeka, Kansas for all years of record.

It is agreed and understood that Professor McKinney will use this information for research purposes only, in connection with the Rural Economic Development research project and that all information will be treated in the strictest confidence. It is further agreed that no individual's information will in any way be associated with the individual in research reports.

It is further agreed that this power of attorney will remain in force and effect only through December 31, 1961, and that the Department of Revenue, Income Tax Division of the State of Kansas will not honor this power of attorney after the above date.

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Social Security Number)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Witness to signature)

\_\_\_\_\_  
(Witness address)

Appendix B. Factors and procedures used in the classification process.

## PROCESS OF SCORING THE FARM PRODUCTION QUESTIONNAIRE

The following relative values which have been assigned to each piece of farm machinery and various livestock facilities are the personal judgments of the author. The relative merit or degree of importance which was assigned to each innovation is based primarily on the time in which this innovation came into existence and its economic soundness in terms of the resource capabilities of the area.

## Field Crop Machinery:

2-3 Flow tractor	0
3-4 Flow tractor	$\frac{1}{2}$
4 Flow tractor or larger	1
Corn head for a combine	1
Hay conditioner or crusher	1

## Livestock Feeding Equipment:

Automatic feed wagon	1
Automatic feed box on truck	1
Auger in feed bunk	1
Silo unloader	1
Automatic feed mixing plant (portable or stationary)	2

## Grain &amp; Roughage Handling:

Automatic silage loader	2
Automatic bale loader	$\frac{1}{2}$
Grain drying system	1
Hay drying system	1
Portable auger	$\frac{1}{2}$
Hay wafering machine	2

## Livestock Facilities:

Fenceline feed bunks	1
Confined hog feeding facilities (concrete, self feeders, automatic waterers)	1
Farrowing crates	1
Bunker Silo	$\frac{1}{2}$

## Crop Production Practices:

Wheel-track planting	2
Pre-emergence herbicides (Simazin - Atrazine)	2

If the cooperator indicated that he was thinking about a certain practice or he was trying to buy a certain implement at the present time one-half credit was given. It was felt that the interest for the implement or practice must be well-founded in the individual's mind for him to indicate it in longhand.

## COMBINED SCORECARD FOR FARMER CATEGORIES

Farmer Number	Eight Question Analysis	Farm Machinery & Livestock Facil. Questionnaire	Cumulative Total
1	9.0	9.0	18.0
2	9.5	5.0	14.5
3	8.5	6.0	14.5
4	10.0	3.0	13.0
5	2.5	8.5	11.0
6	4.5	6.0	10.5
7	7.0	3.0	10.0
8	5.5	4.5	10.0
9	3.0	7.0	10.0
10	6.5	3.0	9.5
11	3.0	6.0	9.0
12	5.5	3.0	8.5
13	3.0	5.5	8.5
14	2.0	6.5	8.5
15	6.5	1.5	8.0
16	1.0	7.0	8.0
17	3.0	4.5	7.5
18	2.5	5.0	7.5
19	.5	7.0	7.5
20	5.0	2.0	7.0
21	4.0	1.5	5.5
22	3.5	1.5	5.0

## Combined Scorecard for Farmer Categories (cont.)

Farmer Number	Eight Question Analysis	Farm Machinery & Livestock Facil. Questionnaire	Cumulative Total
23	0	5.0	5.0
24	2.5	2.0	4.5
25	2.0	2.5	4.5
26	-1.0	5.5	4.5
27	2.0	1.5	3.5
28	1.5	2.0	3.5
29	- .5	4.0	3.5
30	2.0	1.0	3.0
31	-2.5	5.5	3.0
32	- .5	3.0	2.5
33	-1.5	4.0	2.5
34	.5	1.5	2.0
35	-1.0	2.0	1.0
36	-2.5	2.0	- .5
37	-2.5	1.5	-1.0
38	-3.5	1.5	-2.0
39	-5.0	3.0	-2.0
40	-6.0	1.5	-4.5
41	-6.5	1.5	-5.0
42	-6.5	1.5	-5.0

Innovator category - numbers 1-20

Limitational Innovator category - numbers 21-35

Non Innovator category - numbers 36-42

### Combined Scorecard for Farmer Categories (concl.)

Reasons for the divisions into the three classifications:

(1) The first division point split farmer number 20 and 21 because of the decided reduction in the cumulative score. The break between 5.5 and 7.0 and the quality of answers given warrant a division at this point.

(2) The last division was made between number 35 and 36 based on the negative cumulative total. This negative amount indicated low scores on both questionnaires.

(3) The ranking was based primarily on total cumulative score, but in cases of ties the individual receiving the highest score on the eight question analysis was given priority.

Appendix C. The relative proportions of owned and rented land.



Table 1. Analysis of the relative proportions of cropland and pastureland encompassing the average owned land acreages by innovation categories.

Item	Innovator	Limitational Innovator	Non Innovator
1940			
Average acres of cropland owned	80	32	38
Percent of total	94%	80%	95%
Average acres of pasture owned	5	8	2
Percent of total	6%	20%	5%
Average acres of total land owned	85	40	40
Percent of total	100%	100%	100%
1950			
Average acres of cropland owned	147	273	142
Percent of total	88%	90%	94%
Average acres of pasture owned	21	30	9
Percent of total	12%	10%	6%
Average acres of total land owned	168	303	151
Percent of total	100%	100%	100%
1960			
Average acres of cropland owned	284	292	197
Percent of total	61%	82%	82%
Average acres of pasture owned	179	62	43
Percent of total	39%	18%	18%
Average acres of total land owned	463	354	240
Percent of total	100%	100%	100%
1970			
Average acres of cropland owned	284	427	222
Percent of total	82%	87%	81%
Average acres of pasture owned	63	66	53
Percent of total	18%	13%	19%
Average acres of total land owned	347	493	275
Percent of total	100%	100%	100%

Table 2. Analysis of the relative proportions of cropland and pastureland encompassing the average rented land acres by innovation categories.

Item	Innovator	Limitational Innovator	Non Innovator
1940			
Average acres of cropland rented	234	432	224
Percent of total	78%	93%	81%
Average acres of pasture rented	66	31	51
Percent of total	22%	7%	19%
Average acres of total land rented	300	463	275
Percent of total	100%	100%	100%
1950			
Average acres of cropland rented	403	582	326
Percent of total	73%	80%	85%
Average acres of pasture rented	151	146	57
Percent of total	27%	20%	15%
Average acres of total land rented	554	728	383
Percent of total	100%	100%	100%
1960			
Average acres of cropland rented	471	736	356
Percent of total	72%	86%	82%
Average acres of pasture rented	186	123	80
Percent of total	28%	14%	18%
Average acres of total land rented	657	859	436
Percent of total	100%	100%	100%
1970			
Average acres of cropland rented	553	735	341
Percent of total	73%	80%	75%
Average acres of pasture rented	208	189	114
Percent of total	27%	20%	25%
Average acres of total land rented	761	924	455
Percent of total	100%	100%	100%



Appendix D. Expansion of equity in the farm business.

Table 4. Analysis of average expansion of equity in the farm business, 1940-1970 - Innovators

Equity Accounts	1940		1950		1960		1970	
	: value :	: total :	: value :	: total :	: value :	: total :	: value :	: total :
<b>Assets</b>								
Value of owned land	11,714	60	22,350	42	49,022	44	66,725	49
Value of farm buildings	857	5	4,192	8	7,101	6	7,775	6
Value of house	500	2	7,700	14	9,662	9	10,400	7
Value of machinery and equipment	3,286	17	8,611	16	18,464	16	20,975	15
Cash on hand	371	2	593	1	1,255	1	500	0
Value of stocks, bonds and investments	2,014	10	1,913	4	6,182	6	6,525	5
Money owed to you	—	0	67	0	—	0	—	0
Value of livestock	714	4	7,559	14	15,340	14	21,675	16
Other assets	—	0	400	1	4,000	4	2,500	2
Total assets	19,456	100	53,305	100	111,026	100	137,075	100
<b>Liabilities</b>								
Debts on real estate	—	0	3,867	53	7,325	35	2,700	24
Debts on machinery and equipment	1,571	100	3,433	47	12,505	60	8,750	76
Other notes	—	0	—	0	1,000	5	—	0
Total debts	1,571	100	7,300	100	20,830	100	11,450	100
Net Worth	17,885		46,085		90,196		125,625	

Table 5. Analysis of average expansion of equity in the farm business, 1940-1970 --  
 Limitational Innovators

	1940		1950		1960		1970	
Equity Accounts	Average: % of : value : total :	Average: % of : value : total :	Average: % of : value : total :	Average: % of : value : total :	Average: % of : value : total :	Average: % of : value : total :	Average: % of : value : total :	Average: % of : value : total :
<b>Assets</b>								
Value of owned land	13,357	52	15,167	38	28,453	38	27,677	32
Value of farm buildings	3,171	12	4,529	11	5,557	7	7,331	9
Value of house	4,257	17	3,137	8	6,577	9	5,077	6
Value of machinery and equipment	3,371	13	11,325	28	20,733	28	27,615	32
Cash on hand	114	0	1,833	5	1,517	2	1,885	2
Value of stocks, bonds and investments	1,143	4	2,625	7	3,567	5	6,677	8
Money owed to you	—	0	—	0	—	0	—	0
Value of livestock	514	2	1,275	3	2,233	3	4,885	6
Other assets	—	0	—	0	5,880	8	3,954	5
<b>Total assets</b>	<b>25,927</b>	<b>100</b>	<b>39,891</b>	<b>100</b>	<b>74,517</b>	<b>100</b>	<b>85,101</b>	<b>100</b>
<b>Liabilities</b>								
Debts on real estate	2,143	89	2,542	70	3,973	57	3,269	71
Debts on machinery and equipment	—	0	1,100	30	3,007	43	1,346	29
Other notes	257	11	—	0	—	0	—	0
<b>Total debts</b>	<b>2,400</b>	<b>100</b>	<b>3,642</b>	<b>100</b>	<b>6,980</b>	<b>100</b>	<b>4,615</b>	<b>100</b>
<b>Net Worth</b>	<b>23,527</b>		<b>36,249</b>		<b>67,537</b>		<b>80,486</b>	

Table 6. Analysis of average expansion of equity in the farm business, 1940-1970 - Non Innovators

Equity Accounts	1940		1950		1960		1970	
	Average: % of : value : total:	Average: % of : value : total:	Average: % of : value : total:	Average: % of : value : total:	Average: % of : value : total:	Average: % of : value : total:	Average: % of : value : total:	
<b>Assets</b>								
Value of owned land	4,286	31	20,964	50	34,107	44	45,821	51
Value of farm buildings	1,143	8	3,375	8	6,661	9	7,661	8
Value of house	1,286	10	2,661	6	7,018	9	7,232	8
Value of machinery and equipment	3,343	24	8,486	20	13,750	18	15,171	17
Cash on hand	643	5	871	2	4,871	6	2,357	3
Value of stocks, bonds and investments	714	5	629	2	2,071	3	2,286	3
Money owed to you	---	0	---	0	---	0	---	0
Value of livestock	2,357	17	4,914	12	6,214	8	9,143	10
Other assets	---	0	---	0	2,571	3	286	0
Total assets	13,772	100	41,900	100	77,263	100	89,957	100
<b>Liabilities</b>								
Debts on real estate	---	0	857	24	1,571	23	2,143	37
Debts on machinery and equipment	1,143	100	2,657	76	5,171	77	3,643	63
Other notes	---	0	---	0	---	0	---	0
Total debts	1,143	100	3,514	100	6,742	100	5,786	100
Net Worth	12,629		38,386		70,521		84,171	

Appendix E. Key to income and expense analysis.



## KEY TO INCOME AND EXPENSE ANALYSIS

## I. Receipts

## A. Sales of livestock

1. Includes all sales of beef, swine, poultry, sheep, etc.

## B. Sales of farm produce

1. Crops - includes sales of all farm raised crops
2. Other - includes sales of eggs, milk, processed meat products, etc.

## C. Other farm income

1. Proration - co-op elevators
2. Gas tax refund
3. Auto expense allowances
4. Custom work including hiring out machinery and truck
5. Labor off the farm up to a maximum of \$500
6. Soil bank payments
7. Cash rents for farm real estate

## II. Expenses

- A. Hired labor includes the salary of the employee plus food and lodging allowance claimed on the state income tax form.
- B. Depreciation includes farm machinery, farm buildings and everything depreciable.

## III. Miscellaneous

- A. Capital gains and losses were added to or deducted from the particular account in question. For example, capital gains on livestock were added to livestock sales and capital gains on machinery and land were credited to the other farm income section.

- B. Accrual basis of analysis was calculated on the basis of beginning inventory plus purchases minus ending inventory plus total sales.

Items Not Included Within The Income Section

- A. Interest on stocks, bonds, etc.
- B. Fees for extra services, directors of banks, agricultural committees
- C. Oil leases
- D. Dividends from other than farm agencies
- E. Large off-farm employment - for items which total over \$500,  
(such as driving a school bus) only a total of \$500 was considered

SOCIOECONOMIC CHARACTERISTICS OF SOUTH CENTRAL KANSAS FARM INNOVATORS

by

LEO LAWRENCE GRAM

B. S., Kansas State University, 1958

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AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Economics and Sociology

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

1961

The farming profession is currently undergoing a number of significant changes and the effects of change are felt by all segments of the economy. One of the primary factors contributing to the rapid changes taking place within the agricultural segment of the economy can be attributed to the productive results of agricultural related scientific research. New production methods and practices are continually coming upon the scene, and as these new innovations continue to emerge at more rapidly increasing rates the complex surrounding agriculture also continues to change at an accelerated rate. Farm numbers continue to diminish and the remaining farms continue to increase in size.

What are the characteristics of the farmer who is able to withstand the competition in agriculture and emerge with considerable amounts of apparent success? Is there any relationship between the innovative or early acceptance capabilities of farmers and their varying degrees of success?

This thesis is concerned with the associations and implications surrounding early acceptance of new farm production practices, and attempts to illustrate the relative effects resulting from varying degrees of innovative receptiveness on the part of the study population.

The study population included forty-two Rice county farmers who were recognized as possessing outstanding abilities in the culture of crops, raising of livestock and management of the farm business.

The objectives of the study were to:

1. Analyze the characteristics of outstanding farmers who differ in the rate at which they accept new farm production innovations and establish essential differences among the groups in the areas of:
  - a. Personal physical and mental qualities
  - b. Size of business operation in terms of acres and the various ramifications therein
  - c. Relative success derived from the practices used on the resource land

- d. Size of business operation in terms of animal units possessed and the apparent differences resulting from the degrees toward which the animal unit resources are utilized
- e. Incomes received from various predetermined sources and personal opinions as to amounts of income needed for family living and personal satisfaction
- f. Amounts and relative proportions of dollars contributing to the equity of the farm business
- g. Judgments as to the factors contributing to the individual success in the chosen occupation of farming
- h. Labor necessities and relative proportions necessary for the operation of the farm business
- i. Desires and anticipations for the future organization of their farm business
- j. Opinions as to the future of agriculture and the controversial issues which are destined to be a vital integral in tomorrow's agriculture

The information for the study was obtained primarily from the outstanding farmer questionnaire taken by the Kansas State University Rural Economic Development project during the spring of 1960, and was analyzed statistically. The results of this study can be applied to any of the counties included within the south central Kansas economic development area. It is also felt that the broad implications and associations surrounding this study do provide insight into the situation existing within agriculture both on a local and national scale.

The more important statistical differences found among the study clientele were as follows:

1. Farmers ranking lower in innovation acceptability managed larger acreages of cropland.
2. The innovator consistently managed larger numbers of animal units than the innovation categories ranking lower in innovation acceptability.
3. The innovator consistently received larger gross and net farm income than the remaining innovation categories. The primary reason for the larger gross incomes can be directly attributed to the sale of livestock. The lower innovation categories had larger receipts from the sale of crops, but this was not large enough to equate the opportunity return which might have been received from the sale of livestock.

4. The innovator carried a higher level of indebtedness than the farmers ranking lower in innovation acceptability.
5. The farm business expenditure analysis revealed that:
  - a. The innovator consistently received larger amounts from depreciation.
  - b. The categories rated lower in innovation acceptability paid out larger amounts for insurances.
  - c. The innovator consistently paid out larger amounts for hired labor.

Some additional findings, although statistically nonsignificant, which provide a more lucid portrayal of circumstances and tendencies surrounding the study population and lend additional strength to the statistically significant findings include:

1. The innovators were younger in chronological age, had more formalized education and had less experience in the farming profession.
2. The innovator managed larger acreages of pastureland, but in estimating the plans for the future it was found that the innovator was planning to substantially reduce his owned pasture acreages while the lower innovation categories were planning to hold approximately the same amount of pastureland as they currently possess.
3. The innovator consistently spent larger amounts for fertilizer on continuous wheat, grain sorghum and forage sorghum while the lower innovation categories spent larger amounts for fertilizer on fallow wheat.
4. The innovator spent larger amounts for insecticides on field crops than the lower innovation categories.
5. The innovator consistently possessed larger accumulations of total assets and had a resulting higher net worth.
6. The innovator utilized six more labor equivalent months in the operation of the farm business than the lower innovation categories. The innovator also employed hired labor the equivalent of eight months per year while the lower innovation categories used approximately two months equivalent of hired labor. The innovator's wife did not perform any measurable amount of farm work while the lower innovation categories employed their wives 2.5 months per year in actual outside farm work.
7. The living cost analysis indicated that the innovator experienced higher living costs than the lower innovation categories. It was

also found that the innovator possessed a much more liberal attitude when he was asked to estimate the amounts of income which would meet the average needs of above-average farm families.

8. The personal analysis of the future of agriculture in Rice county indicated that the innovator realistically appraised the problems facing agriculture and stated that there should be fewer farmers in 1970 than there were in 1960. The lower innovation categories refused to face reality, however, and stated that there should be more farmers in Rice county in 1970 than there were in 1960.

The results of this study indicate that there are distinguishable differences existing among the outstanding farm operators who differ in their rate of acceptance of innovations in farm production practices, and the differences uncovered were of enough magnitude to cause the rejection of the null hypothesis that the outstanding farmers of Rice County, Kansas who differ in the rate at which they accept new farm production innovations do not differ in the methods of farm production practices that they employ and the results that they receive in the operations surrounding the business and family living aspects of rural life.