

THE VALUE OF WHEAT AS A FEED FOR FATTENING YEARLING STEERS

by

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B. S. A., Kansas State College
of Agriculture and Applied Science, 1922

A THESIS

submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE

KANSAS STATE COLLEGE
OF AGRICULTURE AND APPLIED SCIENCE

1932

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INTRODUCTION

Investigations at numerous experiment stations have demonstrated the importance of wheat as a grain for fattening hogs, especially when wheat and corn are available at approximately the same price per bushel. Comparatively little experimental work, however, has been conducted to secure data on the value of wheat when fed to cattle. The work in the past has been spread out over a period of about sixty years with information being collected only during periods of low priced wheat and by the time the data were available the period of low prices had passed and feeders were no longer interested in feeding wheat. Also these periods in which wheat could profitably be fed to cattle have been so far apart that feeding methods often changed from one period to the next.

In this thesis the writer has briefly considered the results of an experiment conducted at the Kansas Agricultural Experiment Station during the winter of 1931-32 in which ground wheat and ground corn and mixtures of ground wheat and ground corn were compared when fed to yearling steers. A number of experiments conducted at other stations have also been summarized in order to

secure further information on wheat as a feed for cattle.

REVIEW OF LITERATURE

Corn in the past has been the principal grain used in the fattening of cattle throughout the corn belt, due to the fact that it has been the most common and cheapest grain available. However, there have been periods during which other grains have been more or less prominent, due to the scarcity of corn or to the spread between the price of corn and the price of other grains.

Wheat as compared with corn, carries slightly more carbohydrates, more crude protein, and less fat. Though low in minerals, wheat contains more lime, phosphoric acid and potash than corn. Henry and Morrison (1) give the nutritive ratio of dent corn as 1:10.4, and that of wheat 1:7.7. The composition of the wheat kernel varies widely with climatic conditions. Wheat like corn should be supplemented by a feed rich in protein and lime, and, when fed in properly balanced rations, its chemical composition would indicate it should be about equal to corn in fattening cattle.

The kernel of wheat being small and hard should always be cracked or crushed before being fed, but it

should not be finely ground, for when fed in this condition it often forms a pasty mass in the mouth of the animal that may lead to digestive disturbances (Moffett) (2). This is due to the nature of the protein found in wheat which differs from that found in any other seed by the fact that these proteins may be largely separated as an elastic mass by washing the dough made from finely ground wheat in water. This protein has long been known as gluten. It consists chiefly of the two proteins, gliadin and glutenin.

It has been recently shown that in the process of digestion the proteins are broken down into amino acids and that the animal forms from these, by the process of assimilation, the proteins of its blood and body tissue. Henry and Morrison (1) state that, "Some proteins, as the principal ones of wheat, yield on digestion as much as 40 per cent of a certain single amino acid, which forms only 14 per cent of the animal's proteins. With wheat proteins as the sole source of amino acids for growth, obviously a considerable part will be wasted. There are certain proteins which entirely lack some of the essential amino acids and so will produce no growth." It is believed that animals can construct in their bodies

from other nutrients but a very few of the different amino acids if any at all.

Trials have shown that wheat is less palatable than corn. The results of most experiments where wheat was fed to cattle indicate that they will not consume as heavy a ration of wheat as corn. Cattle fed wheat usually make smaller gains but require less grain per 100 pounds of gain.

In trials by Moffett (2), Baker (4), Thorne and Hickman (3), and Blizzard (5), ground wheat was found to be less palatable than ground corn, produced less gain, and less grain was required per 100 pounds gain by steers fed wheat than was required by similar steers fed ground corn. Good (6) in one trial reports that when the daily consumption of wheat and corn were held the same, ground wheat produced larger daily gains and less grain was required per 100 pounds gain than where steers were fed corn. Burnett and Smith (7) found the daily consumption of wheat to be greater than that of corn, producing more rapid gains on less grain. Moffett (2) in one trial reports that whole wheat is more palatable than ground wheat judging from the amount of wheat consumed per steer per day. It produces greater gains than ground wheat, but is

less efficient in producing gain due to the large amount of whole grain leaving the animal undigested. Baker (4) and Moffett (2) found that ground wheat is more efficient in producing gains than either shelled corn or ground corn. Thalman and Gramlich (8), Snapp (9), Cooke (10) found that when a mixture of equal parts by weight of ground wheat and ground corn was fed, the rate of gain was greater and the feed consumed per 100 pounds gain was less than when ground corn was fed. Moffett (2), Baker (4) report that steers fed shelled corn were fatter, carried a better finish and sold for more on the market when finished than similar steers fed ground wheat.

Hart (11) reports a summary of the preliminary results of feeding wheat to growing and reproducing heifers extending over a period of four years. It was found that animals receiving their nutrients from the wheat plant were unable to perform normally and with vigor the above physiological processes. Similar animals receiving their nutrients from the corn plant were strong and vigorous and produced normal young. When an animal was changed from a wheat diet to a corn diet a noticeable improvement in condition was obtained. The urines of the wheat-fed animals were alkaline. However, the reasons for these results were not determined.

Hart and McCollum (12) report that the excessive feeding of wheat caused decidedly injurious effects upon cattle. They found that cows did not produce normal calves when fed chemically balanced rations from the wheat plant. However, when other roughages as corn stover or alfalfa hay were fed instead of wheat straw, normal calves were produced the first gestation period but calves produced during the second gestation period showed a poisonous effect and were born blind or weak. This would tend to show that the injurious effect of wheat feeding is cumulative. Further study was made and it was found that the wheat embryo contained something of a poisonous nature, the chemical composition of this substance being as yet unknown.

THE EXPERIMENT

The following is a report of a test conducted during the winter of 1931-32 by the author in cooperation with A. D. Weber and W. E. Connell. A study was made of the comparative value of ground corn and ground wheat, and combinations of ground corn and ground wheat fed with cottonseed meal and alfalfa hay with and without silage.

Object

Due to the low price of wheat in the summer of 1931, and to the fact that many inquiries were received at the Kansas Agricultural Experiment Station requesting information on the value of wheat as a fattening feed for cattle, two series of tests were conducted to secure further information on the value of wheat as a feed for fattening cattle.

Steers Used

For this test, eighty yearling steers were purchased on the open market in Kansas City. The experiment was conducted for a period of 180 days, beginning at noon November 24, 1931 and closing at noon May 22, 1932. The eighty head of steers were divided into eight lots, Lots 1, 2, 3 and 4 comprising the first series and Lots 5, 6, 7 and 8 making up the second series.

Rations Fed

The following feeds were used in the first series:
Lot 1 - Ground corn, cottonseed meal, alfalfa hay
and atlas sorgo silage.

Lot 2 - Ground corn $\frac{2}{3}$, ground wheat $\frac{1}{3}$, cottonseed meal, alfalfa hay and atlas sorgo silage.

Lot 3 - Ground corn $\frac{1}{3}$, ground wheat $\frac{2}{3}$, cottonseed meal, alfalfa hay and atlas sorgo silage.

Lot 4 - Ground wheat, cottonseed meal, alfalfa hay and atlas sorgo silage.

In the second series the following feeds were fed:

Lot 5 - Ground corn, cottonseed meal and alfalfa hay.

Lot 6 - Ground corn $\frac{2}{3}$, ground wheat $\frac{1}{3}$, cottonseed meal and alfalfa hay.

Lot 7 - Ground corn $\frac{1}{3}$, ground wheat $\frac{2}{3}$, cottonseed meal and alfalfa hay.

Lot 8 - Ground wheat, cottonseed meal and alfalfa hay.

Methods of Procedure

The yearling Hereford steers used in this test were received in Manhattan November 3 direct from the Kansas City market. They were grazed on bluestem pasture until November 17, at which time they were started on silage and alfalfa hay until the start of the experiment November 24. In the allotment of these steers special effort was made to secure uniform lots. Each steer was rated as to his probable feeding ability, temperament, and whether he

was upstanding or of a nervous disposition. After this rating the steers were allotted so as to have all the lots as near uniform as possible in quality, form, temperament, and weight. The initial weight was obtained by weighing each individual steer for three consecutive days and taking the average of these weights. The final weights were obtained in a like manner. The steers were weighed individually every 28 days throughout the test.

A study of this experiment reveals that two distinct series were fed. Each of these series will be treated separately. Series I includes Lots 1, 2, 3 and 4, each of which received silage in conjunction with grain, cottonseed meal and alfalfa hay. The second series, composed of Lots 5, 6, 7 and 8, was fed the same feeds as the first series except that no silage was fed.

The grain portion of the ration was fed according to appetite. Thus differences in the palatability of ground corn and ground wheat or mixtures of the two, were determined directly since the other components of the ration were fed in approximately the same amounts. However, increases in grain were made at the same rate in all lots until the average daily grain consumption was twelve pounds.

Great care was taken in getting the steers on full feed so as not to get them off feed or cause any digestive disturbances. All lots in the experiment were hand-fed the grain, cottonseed meal, and roughage twice daily - morning and evening - at regular hours.

In the first series, Lots 1, 2, 3 and 4 the silage was put in the feed bunks and the grain and cottonseed meal were mixed with the silage. After the steers had finished eating the grain and silage the hay was fed. In Series II, Lots 5, 6, 7 and 8, the grain and cottonseed meal were placed in the feed bunks together and hay was fed after the steers had consumed the grain.

In Series I, Lots 1, 2, 3 and 4, the steers were started on $2\frac{1}{2}$ pounds of grain, 1 pound of cottonseed meal, 15 pounds of silage, and 2 pounds of alfalfa hay. The grain was gradually increased at the rate of $\frac{3}{5}$ of a pound per steer every three days until the steers were on full feed. Cottonseed meal was fed at the rate of 1 pound per steer per day at the start and increased $\frac{1}{10}$ of a pound per day until two pounds were being fed per day per steer at which point it remained the same throughout the experiment. Silage was gradually decreased as the grain was increased. The alfalfa hay remained at 2 pounds throughout the experiment.

In Series II, the steers were started on grain in the same manner as in Series I. Cottonseed meal was fed at the start at the rate of 1 pound per steer daily and kept at this level throughout the experiment. Alfalfa hay was fed as the sole roughage, 15 pounds per steer were fed at the start and the amount decreased as the grain was increased.

Results

The results obtained in Series I of this experiment are given in detail in Tables I and II, while those obtained in Series II are given in Tables III and IV.

Table I.- Average daily rations by 28-day periods - Series I.

| Lot number | 1 | 2 | 3 | 4 |
|--------------------------------|-------|-------|-------|-------|
| First 28-day period: | | | | |
| Ground corn | 6.54 | 4.36 | 2.18 | .... |
| Ground wheat | .... | 2.18 | 4.36 | 6.49 |
| Cottonseed meal | 1.78 | 1.78 | 1.78 | 1.76 |
| Alfalfa hay | 2.00 | 2.00 | 2.00 | 2.00 |
| Silage | 24.54 | 23.32 | 24.96 | 24.44 |
| Second 28-day period: | | | | |
| Ground corn | 14.08 | 9.03 | 4.43 | .... |
| Ground wheat | .... | 4.51 | 8.85 | 12.78 |
| Cottonseed meal | 2.00 | 2.00 | 2.00 | 2.00 |
| Alfalfa hay | 2.00 | 2.00 | 2.00 | 2.00 |
| Silage | 12.61 | 11.96 | 13.61 | 12.68 |
| Third 28-day period: | | | | |
| Ground corn | 17.86 | 10.05 | 5.29 | .... |
| Ground wheat | .... | 5.02 | 10.59 | 12.79 |
| Cottonseed meal | 2.00 | 2.00 | 2.00 | 2.00 |
| Alfalfa hay | 2.00 | 2.00 | 2.00 | 2.00 |
| Silage | 8.04 | 8.04 | 8.04 | 8.04 |
| Fourth 28-day period: | | | | |
| Ground corn | 17.75 | 10.30 | 5.31 | .... |
| Ground wheat | .... | 5.15 | 10.61 | 12.51 |
| Cottonseed meal | 2.00 | 2.00 | 2.00 | 2.00 |
| Alfalfa hay | 2.00 | 2.00 | 2.00 | 2.00 |
| Silage | 7.36 | 7.36 | 7.36 | 7.36 |
| Fifth 28-day period: | | | | |
| Ground corn | 16.52 | 9.89 | 4.96 | .... |
| Ground wheat | .... | 4.94 | 9.93 | 13.70 |
| Cottonseed meal | 2.00 | 2.00 | 2.00 | 2.00 |
| Alfalfa hay | 2.00 | 2.00 | 2.00 | 2.00 |
| Silage | 6.25 | 6.25 | 6.25 | 6.25 |
| Sixth 28-day period: | | | | |
| Ground corn | 16.03 | 9.89 | 4.90 | .... |
| Ground wheat | .... | 4.95 | 9.80 | 13.72 |
| Cottonseed meal | 2.00 | 2.00 | 2.00 | 2.00 |
| Alfalfa hay | 2.00 | 2.00 | 2.00 | 2.00 |
| Silage | 6.00 | 6.00 | 6.00 | 6.00 |
| Last 12 days: | | | | |
| Ground corn | 14.40 | 9.30 | 4.43 | .... |
| Ground wheat | .... | 4.65 | 8.87 | 11.65 |
| Cottonseed meal | 2.00 | 2.00 | 2.00 | 2.00 |
| Alfalfa hay | 2.00 | 2.00 | 2.00 | 2.00 |
| Silage | 6.00 | 6.00 | 6.00 | 6.00 |
| Average of all periods: | | | | |
| Ground corn | 14.77 | 8.94 | 4.51 | .... |
| Ground wheat | .... | 4.47 | 9.01 | 11.98 |
| Cottonseed meal | 1.97 | 1.97 | 1.97 | 1.97 |
| Alfalfa hay | 2.00 | 2.00 | 2.00 | 2.00 |
| Silage | 10.48 | 10.19 | 10.70 | 10.47 |

Table II.- Average daily rations by 28-day periods - Series II.

| Lot number | 1 | 2 | 3 | 4 |
|-------------------------|-------|-------|-------|-------|
| First 28-day period: | | | | |
| Ground corn | 6.47 | 4.36 | 2.18 | .... |
| Ground wheat | .... | 2.18 | 4.36 | 6.47 |
| Cottonseed meal | 1.00 | 1.00 | 1.00 | .99 |
| Alfalfa hay | 12.04 | 12.14 | 12.75 | 12.27 |
| Second 28-day period: | | | | |
| Ground corn | 13.52 | 9.39 | 4.51 | .... |
| Ground wheat | .... | 4.79 | 9.02 | 12.64 |
| Cottonseed meal | 1.00 | 1.00 | 1.00 | 1.00 |
| Alfalfa hay | 6.46 | 7.07 | 7.00 | 6.89 |
| Third 28-day period: | | | | |
| Ground corn | 17.26 | 11.94 | 5.01 | .... |
| Ground wheat | .... | 5.97 | 10.03 | 13.58 |
| Cottonseed meal | 1.00 | 1.00 | 1.00 | 1.00 |
| Alfalfa hay | 4.18 | 4.18 | 4.18 | 4.18 |
| Fourth 28-day period: | | | | |
| Ground corn | 17.55 | 11.80 | 5.45 | .... |
| Ground wheat | .... | 5.90 | 10.90 | 15.17 |
| Cottonseed meal | 1.00 | 1.00 | 1.00 | 1.00 |
| Alfalfa hay | 4.00 | 4.00 | 4.00 | 4.00 |
| Fifth 28-day period: | | | | |
| Ground corn | 15.30 | 11.00 | 5.56 | .... |
| Ground wheat | .... | 5.50 | 11.11 | 15.45 |
| Cottonseed meal | 1.00 | 1.00 | 1.00 | 1.00 |
| Alfalfa hay | 4.00 | 4.00 | 4.00 | 4.00 |
| Sixth 28-day period: | | | | |
| Ground corn | 14.81 | 9.54 | 5.39 | .... |
| Ground wheat | .... | 4.77 | 10.78 | 14.93 |
| Cottonseed meal | 1.00 | 1.00 | 1.00 | 1.00 |
| Alfalfa hay | 4.00 | 4.00 | 4.00 | 4.00 |
| Last 12 days: | | | | |
| Ground corn | 12.66 | 9.02 | 4.80 | .... |
| Ground wheat | .... | 4.51 | 9.60 | 13.95 |
| Cottonseed meal | 1.00 | 1.00 | 1.00 | 1.00 |
| Alfalfa hay | 3.33 | 3.33 | 3.33 | 3.33 |
| Average of all periods: | | | | |
| Ground corn | 14.05 | 9.63 | 4.69 | .... |
| Ground wheat | .... | 4.81 | 9.38 | 13.10 |
| Cottonseed meal | 1.00 | 1.00 | 1.00 | 1.00 |
| Alfalfa hay | 5.62 | 5.73 | 5.81 | 5.72 |

Table III.--Comparison of ground wheat and ground corn when fed in conjunction with cottonseed meal, atlas sorgo silage, and alfalfa hay.

| November 24, 1931 to May 22, 1932 - 180 days | | | | |
|--|--|--|--|---|
| Lot number | 1 | 2 | 3 | 4 |
| Rations fed | : Ground : : corn : : Cotton- : seed : : meal : : Silage : : Alfalfa: : hay : | : Ground : : corn 2 : : Ground : : wheat 1: : Cotton- : seed : : meal : : Silage : : Alfalfa: : hay : | : Ground : : corn 1 : : Ground : : wheat 2: : Cotton- : seed : : meal : : Silage : : Alfalfa: : hay : | : Ground : : wheat : : Cotton- : seed : : meal : : Silage : : Alfalfa: : hay : |
| Number of steers per lot | : 10 | : 10 | : 10 | : 10 |
| Initial weight per steer | : Pounds: : 619.58: | : Pounds: : 613.67: | : Pounds: : 614.00: | : Pounds: : 612.50: |
| Final weight per steer | : 1040.67: | : 1046.00: | : 1049.00: | : 1000.83: |
| Total gain per steer | : 421.09: | : 432.33: | : 435.00: | : 388.33: |
| Daily gain per steer | : 2.34: | : 2.40: | : 2.42: | : 2.16: |
| Daily feed consumption per steer: | : | : | : | : |
| Ground corn | : 14.77: | : 8.94: | : 4.51: | : |
| Ground wheat | :: | : 4.47: | : 9.01: | : 11.98 |
| Cottonseed meal | : 1.97: | : 1.97: | : 1.97: | : 1.97 |
| Silage | : 10.48: | : 10.19: | : 10.70: | : 10.47 |
| Alfalfa hay | : 2.00: | : 2.00: | : 2.00: | : 2.00 |
| Feed consumption per 100 pounds of gain: | : | : | : | : |
| Ground corn | : 631.27: | : 372.35: | : 186.47: | : |
| Ground wheat | :: | : 186.18: | : 372.94: | : 555.11 |
| Cottonseed meal | : 84.04: | : 81.86: | : 81.36: | : 91.01 |
| Silage | : 447.89: | : 424.21: | : 442.76: | : 485.51 |
| Alfalfa hay | : 85.49: | : 83.27: | : 82.76: | : 92.60 |

Table IV.- Comparison of ground wheat and ground corn when fed
in conjunction with cottonseed meal and alfalfa hay.

| November 24, 1931 to May 22, 1932 - 180 days | | | | |
|--|---|--|--|--|
| Lot number | 5 | 6 | 7 | 8 |
| Rations fed | : Ground : corn : Cotton- : seed : meal : Alfalfa : hay | : Ground : corn 2 : Ground : wheat 1 : Cotton- : seed : meal : Alfalfa : hay | : Ground : corn 1 : Ground : wheat 2 : Cotton- : seed : meal : Alfalfa : hay | : Ground : wheat : Cotton- : seed : meal : Alfalfa : hay |
| Number of steers per lot | : 9 | : 10 | : 10 | : 10 |
| Initial weight per steer | : 604.07 | : 606.33 | : 604.50 | : 604.33 |
| Final weight per steer | : 1047.04 | : 1057.33 | : 1081.33 | : 1063.50 |
| Total gain per steer | : 442.97 | : 451.00 | : 476.83 | : 459.17 |
| Daily gain per steer | : 2.46 | : 2.51 | : 2.65 | : 2.55 |
| Daily feed consumption per steer: | | | | |
| Ground corn | : 14.05 | : 9.63 | : 4.69 | : |
| Ground wheat | : | : 4.81 | : 9.38 | : 13.10 |
| Cottonseed meal | : 1.00 | : 1.00 | : 1.00 | : 1.00 |
| Alfalfa hay | : 5.62 | : 5.73 | : 5.81 | : 5.72 |
| Feed consumption per 100 pounds of gain: | | | | |
| Ground corn | : 571.00 | : 384.24 | : 177.08 | : |
| Ground wheat | : | : 192.12 | : 354.16 | : 513.58 |
| Cottonseed meal | : 40.63 | : 39.91 | : 37.75 | : 39.11 |
| Alfalfa hay | : 228.23 | : 228.60 | : 219.37 | : 224.11 |

Comparison of Results - Series I.- A study of Table I will show that there was a difference in the palatability of the grain fed commencing with the second 28-day feeding period. Up until all lots were eating an average of 12 pounds of grain per day there was no noticeable difference in the palatability of the grain fed. However, starting at the time when all lots were consuming about 12 pounds of grain, which was during the second 28-day feeding period, the difference in palatability became evident. Lot 1, fed ground corn, forged ahead and continued to consume more pounds of ground corn per steer during each of the following 28-day periods. Lot 4, fed ground wheat, was very slow to take an increase over 12 pounds of ground wheat and at no time would they consume as much grain as Lot 1. Lot 1 consumed an average of 14.77 pounds of ground corn per day per steer, while Lot 4 consumed an average of 11.98 pounds of ground wheat, a difference of 2.79 pounds of grain in favor of Lot 1.

Comparing Lot 2, fed ground corn $\frac{2}{3}$ and ground wheat $\frac{1}{3}$ with Lot 3, fed ground corn $\frac{1}{3}$ and ground wheat $\frac{2}{3}$, we find very little difference in the amount of grain consumed and thus very little difference was apparent in the palatability. However, the addition of

ground corn to a ration of ground wheat improved its palatability and thus increased the average daily consumption of grain per steer. The addition of ground wheat to a ground corn ration decreased the palatability of the ration and in each case less grain was consumed when ground corn and ground wheat were mixed together than when ground corn only was fed as the grain part of the ration.

Summary of Series I.- These lots involve a comparison of ground corn, ground wheat, and a combination of ground corn and ground wheat fed with a ration of cottonseed meal and alfalfa hay with silage. The lots in Series I ranked as follows:

(a) On the basis of average daily gain:

Lot 3 - Fed ground corn $1/3$, ground wheat $2/3$, cottonseed meal, alfalfa hay and atlas sorgo silage.

Lot 2 - Fed ground corn $2/3$, ground wheat $1/3$, cottonseed meal, alfalfa hay and atlas sorgo silage.

Lot 1 - Fed ground corn, cottonseed meal, alfalfa hay and atlas sorgo silage.

Lot 4 - Fed ground wheat, cottonseed meal, alfalfa hay and atlas sorgo silage.

(b) On the basis of grain consumed per 100 pounds gain:

Lot 4 - Fed ground wheat, cottonseed meal, alfalfa hay and atlas sorgo silage.

Lot 2 - Fed ground corn $\frac{2}{3}$, ground wheat $\frac{1}{3}$, cottonseed meal, alfalfa hay and atlas sorgo silage.

Lot 3 - Fed ground corn $\frac{1}{3}$, ground wheat $\frac{2}{3}$, cottonseed meal, alfalfa hay and atlas sorgo silage.

Lot 1 - Fed ground corn, cottonseed meal, alfalfa hay and atlas sorgo silage.

(c) On the basis of palatability of ration as indicated by amount of grain consumed per steer per day:

Lot 1 - Fed ground corn, cottonseed meal, alfalfa hay and atlas sorgo silage.

Lot 3 - Fed ground corn $\frac{1}{3}$, ground wheat $\frac{2}{3}$, cottonseed meal, alfalfa hay and atlas sorgo silage.

Lot 2 - Fed ground corn $\frac{2}{3}$, ground wheat $\frac{1}{3}$, cottonseed meal, alfalfa hay and atlas sorgo silage.

Lot 4 - Fed ground wheat, cottonseed meal, alfalfa hay and atlas sorgo silage.

Comparison of Results - Series II.- Table II

indicates that ground wheat was also less palatable than ground corn when these grains were fed without silage. Lot 5, fed ground corn, consumed an average of .95 pound of grain per day per steer more than Lot 8.

However, in comparing Lot 6, fed ground corn 2/3, and ground wheat 1/3, with Lot 7, fed ground corn 1/3 and ground wheat 2/3, we find little difference in the average daily consumption of grain during any of the 28-day feeding periods. The mixtures of ground wheat and ground corn as fed in Lots 6 and 7 were more palatable than ground wheat fed alone (Lot 8). In this series a mixture of ground corn and ground wheat, Lots 6 and 7, was found to be as palatable as a ration of ground corn (Lot 5).

Summary of Series II.-

(a) On the basis of average daily gain:

Lot 7 - Fed ground corn 1/3, ground wheat 2/3,
cottonseed meal and alfalfa hay.

Lot 8 - Fed ground wheat, cottonseed meal and
alfalfa hay.

Lot 6 - Fed ground corn 2/3, ground wheat 1/3,
cottonseed meal and alfalfa hay.

Lot 5 - Fed ground corn, cottonseed meal and alfalfa hay.

(b) On the basis of grain consumed per 100 pounds gain:

Lot 8 - Fed ground wheat, cottonseed meal and alfalfa hay.

Lot 7 - Fed ground corn $1/3$, ground wheat $2/3$, cottonseed meal and alfalfa hay.

Lot 5 - Fed ground corn, cottonseed meal and alfalfa hay.

Lot 6 - Fed ground corn $2/3$, ground wheat $1/3$, cottonseed meal and alfalfa hay.

(c) On the basis of palatability of ration. Judging from the amount of grain consumed per steer per day:

Lot 6 - Fed ground corn $2/3$, ground wheat $1/3$, cottonseed meal and alfalfa hay.

Lot 7 - Fed ground corn $1/3$, ground wheat $2/3$, cottonseed meal and alfalfa hay; and

Lot 5, fed ground corn, cottonseed meal and alfalfa hay were the same.

Lot 8 - Fed ground wheat, cottonseed meal and alfalfa hay.

Comparison of Results - Series I.- A review of Table III shows that it required 631.27 pounds of ground corn (Lot 1) to produce 100 pounds of gain while only 555.11 pounds of ground wheat were required to produce 100 pounds of gain (Lot 4). A combination of ground corn and ground wheat (Lots 2 and 3) was more efficient in producing gains than ground corn fed alone (Lot 1). A comparison of Lots 2 and 3 with Lot 4 indicates that, based on amount of gain produced, a mixture of ground corn and ground wheat and straight ground wheat are equally efficient.

Comparison of Results - Series II.- In Table IV it will be seen that Lot 5 required 571.00 pounds of ground corn to produce 100 pounds of gain while Lot 8 required only 513.58 pounds of ground wheat, a difference of 57.42 pounds of grain in favor of the wheat-fed cattle.

Lots 5 and 6 required almost the same amount of grain per one hundred pounds of gain while Lot 7 required slightly less grain per one hundred pounds of gain. In Lots 5, 6, and 7 where ground corn or a mixture of ground corn and ground wheat were fed, more grain was required for one hundred pounds of gain than in Lot 8 where ground wheat was fed alone.

Marketing Data

Five lots or 49 head of the 80 head of yearling Hereford steers used in this experiment were marketed at Kansas City, Wednesday, June 8. These lots were as follows:

- Lot 1 - Ground corn, cottonseed meal, silage and alfalfa hay.
- Lot 3 - Ground corn $1/3$, ground wheat $2/3$, cottonseed meal, silage and alfalfa hay.
- Lot 4 - Ground wheat, cottonseed meal, silage and alfalfa hay.
- Lot 5 - Ground corn, cottonseed meal and alfalfa hay.
- Lot 8 - Ground wheat, cottonseed meal and alfalfa hay.

All lots were continued on the experimental grain rations until they were shipped. The only change was in the case of roughage, prairie hay being fed the last week in order to prepare the steers for shipment.

Each lot was weighed Tuesday morning, June 7, immediately before being driven to Casement station where they were loaded about eight o'clock Tuesday evening. While

at the station they had access to water and prairie hay. Each lot was weighed separately at Kansas City, making it possible to calculate shrink in transit. However, the shrink was normal in each lot and the differences probably not caused by the rations.

Table V gives in detail weights and shrink of lots sold.

| Lot | Average home weight | Average Kansas City weight | Shrink in pounds | Shrink in per cent |
|-------|------------------------|-------------------------------|---------------------|-----------------------|
| Lot 1 | 1064 | 1021 | 43 | 4.04 |
| Lot 3 | 1081 | 1043 | 38 | 3.52 |
| Lot 4 | 1034 | 991 | 43 | 4.16 |
| Lot 5 | 1073 | 1032 | 41 | 3.82 |
| Lot 8 | 1086 | 1053 | 33 | 3.04 |

Swift and Company purchased these steers and it is through their courtesy that carcass grades and dressing yields are furnished. Data were obtained upon nineteen steers fed ground corn (Lots 1 and 5), twenty steers fed ground wheat (Lots 4 and 8), and ten steers fed ground wheat $\frac{2}{3}$ and ground corn $\frac{1}{3}$ (Lot 3).

Table VI gives the final grades placed on the carcasses by Swift and Company.

| Lot | Grades | | |
|--------------|--------|------|--------|
| | Choice | Good | Medium |
| Lots 1 and 5 | 4 | 12 | 3 |
| Lots 4 and 8 | 1 | 11 | 8 |
| Lot 3 | 3 | 7 | 0 |

The grades of the carcasses of the wheat-fed steers, while satisfactory, did not average as high as those of the corn-fed steers. It would appear, however, that the substitution of ground corn for 1/3 of the ground wheat (Lot 3) resulted in carcasses similar in most respects to those from steers fed corn alone (Lots 1 and 5).

Table VII gives dressing yields based upon home weights and market weights.

| Lot | Carcass weight in pounds | Yield based on | |
|--------------|-----------------------------|----------------|---------------|
| | | Home weight | Market weight |
| Lots 1 and 5 | 651.51 | 61.0 % | 63.5 % |
| Lots 4 and 8 | 633.64 | 59.8 % | 62.0 % |
| Lot 3 | 649.79 | 60.1 % | 62.3 % |

Shrink in transit is responsible for the lower yields when calculations are based on home weights, but it is interesting to note that even on this basis the corn-fed steers yielded slightly higher than those fed wheat or a mixture of wheat and corn.

CONCLUSIONS

While the results of this experiment are not to be considered final, certain conclusions can be drawn as regards wheat as a feed for fattening yearling steers. The following are some of the factors of greatest significance shown by this experiment:

1. Ground wheat is a suitable feed for fattening yearling steers.
2. Ground wheat is not as palatable as ground corn when fed to yearling steers.
3. It will require less ground wheat than ground corn to produce 100 pounds of gain on yearling steers.
4. A mixture of ground corn and ground wheat is more satisfactory as a ration than ground wheat alone.
5. Steers fed ground wheat will shrink about the same as steers fed ground corn.

6. In this test, there was nothing gained by mixing ground wheat with silage when a heavy feed of ground wheat is being fed.
7. Because of superior finish, steers fed ground corn will dress slightly higher than steers fed ground wheat.
8. Carcasses of steers fed ground corn grade higher than carcasses of steers fed ground wheat.
9. The dressing yield and carcass grade of steers fed ground corn or a mixture of ground corn and ground wheat will be higher than steers fed ground wheat.

ACKNOWLEDGMENT

The author is deeply indebted to Dr. C. W. McCampbell and Prof. A. D. Weber and Prof. W. E. Connell for their advice and assistance in the preparation of this thesis.

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