

cost of those gains to such an extent that the use of such high percentages of mustard meal is not advisable in rations for fattening pigs on alfalfa pasture.

Project 110: Swine Feeding Investigations

Experiment II—Summer 1948

THE LIMITED FEEDING OF TANKAGE IN THE RATION OF FATTENING PIGS WHEN SELF-FED CORN ON ALFALFA PASTURE

C. E. Aibel

To produce swine profitably, it is necessary to make use of forage crops. This practice not only saves grain, but contributes to the general health of the hogs. Since swine feeders are seeking new and cheaper methods of producing hogs on pasture, the limited feeding of tankage for fattening pigs on alfalfa pasture was studied in this feeding trial.

How The Hogs Were Fed

Spring pigs were fed from an average weight of about 55 pounds in four lots for a period of 106 days on alfalfa pasture, starting on June 10, 1948. Ten pigs were fed in each lot. All pigs were provided with plenty of good alfalfa pasture during the entire feeding period and had shelled corn, self-fed, free choice.

The difference in treatment was the feeding of a 60 per cent protein tankage supplement during different periods of growth and fattening in the four lots. The tankage was self-fed, free choice with the corn.

The Tankage Supplement Allowance

- Lot 1. No supplement during the feeding period.
- Lot 2. Sixty percent tankage, until the pigs had an average weight of 100 pounds (first 32 days on feed)—none thereafter.
- Lot 3. Sixty percent tankage until the pigs had an average weight of 150 pounds (first 61 days on feed)—none thereafter.
- Lot 4. Sixty percent tankage during the entire feeding period of 106 days.

A summary of the results follows:

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C. E. Aibel

(June 10, 1948 to September 4, 1948—106 Days)

Rations	Tankage (Self-fed) Throughout Entire Period.	Tankage (Self-fed) First 61 Days, Weight 150 lbs...	Tankage (Self-fed) First 32 Days, Weight 100 lbs.	
Lot Number	1	2	3	4
Number of pigs per lot	10	10	10	10
Average Initial Weight per pig	Pounds 55.90	Pounds 57.15	Pounds 56.40	Pounds 54.40
Average Final Weight per pig	158.95	201.55	224.90	250.20
Average Total Gain per pig	103.05	144.40	168.50	195.80

(Continued from preceding page)

Average Daily Gain per pig	.97	1.36	1.58	1.84
Average Daily Ration per pig:				
Corn	3.57	4.11	5.85	6.41
Tankage		.25*	.32†	.42x
Feed Required for 100 pounds gain				
Corn	367.78	301.93	368.24	347.03
Tankage		5.74x	11.86x	22.98
Feed cost per 100 pounds gain	\$15.74	\$13.24	\$16.41	\$16.11

*—Figured on 32 day basis

†—Figured on 61 day basis

x—Figured on 106 day basis

FEED PRICES CHARGED: Shelled corn, \$2.40 per bushel; Tankage, \$110.00 per ton.

METHODS OF FEEDING: All lots were self-fed shelled corn, on alfalfa pasture. The tankage was self-fed the number of days showing in the table, then the pigs received only shelled corn.

Observations

- (1) The maximum use of alfalfa pasture without other protein supplement produced low cost gains.
- (2) Full feeding the protein supplement free choice with the fattening ration of corn and alfalfa pasture increased the rate of gain of the hogs. As the protein feeding period was lengthened, the rate of gain for the entire feeding period was increased.
- (3) The protein supplement was used most effectively in the shorter feeding period where it was omitted from the ration after the hogs had reached the weight of 100 pounds. With this plan of feeding the rate of gain was fairly high and the feed cost low. Feeding the protein for longer periods increased the total feed requirement and cost of gain, although the rate of gain was increased.

Conclusions

The results of these experiments show that hogs will gain efficiently on a full-feed of corn and good alfalfa pasture, without receiving a protein supplement after they have reached a weight of 100 pounds.

The results show further that the feed cost of gains can be kept at a comparatively low figure by omitting the protein supplement from the ration in the beginning. The rate of gain, however, is reduced with this plan of feeding.

If maximum gains are desired despite the higher cost, the protein supplement should be full-fed throughout the fattening period. This speed up in gaining should insure an earlier market with corresponding higher selling price.

Project 217—Meat Investigations,—I, Chemical and Physical Properties of Meat and Their Relationship to Palatability Factors.

Project 260—Factors Influencing the Keeping Qualities and Nutritional Value of Frozen Meat.

MEAT INVESTIGATIONS

David L. Mackintosh and D. B. Watt

The enormous increase in the use of frozen foods and in the num-

ber of frozen locker plants offering freezer storage to the individual, together, have emphasized the need for more research in the field of frozen meat preservation. In order to meet this need a greater part of the research program on meat at the Kansas Agricultural Experiment Station has been devoted to this field of study for several years.

It was recognized early in the history of the frozen food industry that foods stored in the frozen condition tend to dry out rapidly unless well protected. Consequently there has been hwork done toward the improvement of wrapping materials. During the past few years, work has been in progress at this station on the relative merits of existing wrapping materials. The following objectives were sought: (1) Classification of the available materials according to the degree of moisture loss, measured by shrinkage in weight. (2) Direct comparison of the butcher and confectioners's styles of wrapping and, (3) Comparison of single and double wrapping.

Following are some of the conclusions:

1. Wax dip, aluminum foil, aluminum laminate and cellophane with stockinette and other wrapping materials of this type afford a maximum protection against dehydration, permitting less than one-half of one percent loss in weight during 12 months storage.
2. The improved wax paper and glassine laminated paper provided adequate protection against dehydration for six to nine months, after which there is a marked increase in the rate of moisture loss.
3. The ordinary wax papers should not be used for storage periods exceeding three to four months. Ordinary kraft paper is not suitable as a wrapping material for frozen meat.
4. The confectioner's style of wrapping offers no advantage over the butcher style as far as protection against dehydration is concerned, if the wrapping materials is properly applied.
5. There is no practical advantage to double wrapping when using the ordinary wax or kraft papers. A single wrap, properly applied offers as much protection against moisture loss as double wrapping.

Other studies in progress at the present time include the influence of anti-oxidants fed to hogs upon the storage life of the fresh pork, and the methods of handling pork prior to storage upon the keeping quality of the fresh pork. Only slight difference in favor of the pork from hogs receiving the anti-oxidant have been noted to date, and then only after six to nine months storage. Likewise only slight differences favoring the rapid chilling of hog carcasses have been noted.

Additional observations from studies now in progress indicate that fresh pork, properly packaged can be stored satisfactorily for a period of six to nine months at 0°F. After six months storage there is a marked drop in the palatability of the product and a still greater drop after nine months storage. When the storage temperature is -10°F. or lower the quality of the pork is preserved for a longer period. Under present storage conditions it is recommended that all fresh frozen pork be consumed within six months or a maximum of nine months.

Project 260—Factors Influencing the Keeping Qualities and Nutritional Value of Frozen Meat.

SOME BACTERIAL OBSERVATIONS IN FROZEN PORK SAUSAGE PROGRESS REPORT—1948-49—Based in Part on Above Project

Robert L. Hendrickson

The preservation of food by freezing depends upon retarding the rate of microbial, enzymatic, and chemical changes. It is generally agreed that meat and meat products should be sharp-frozen at -10°F. (-23.3°C), and stored at 0°F. (-17.8°C) or lower to retard such changes. Work conducted by the Kansas Agricultural Experiment Station indicates that the quality of fresh pork is preserved for a longer period when frozen and stored at the lower temperature.

The general usage of locker plants by individual families, for the storage of perishable products such as meat, poultry, fruits and vegetables, represents one of the most recent developments in the field of food distribution and preservation.

The presence of micro-organisms in frozen meat may not be important from a pathogenic standpoint, but their presence may be influential in determining the storage life of meat or meat products. The presence of large numbers of bacteria may be due to the method of handling the meat prior to freezing, such as careless management or improper aging. It is a recognized fact that psychrophilic organisms will continue to multiply at chill room temperatures. High Bacterial counts in meat have raised a question in regard to the possible relationship of these micro-organisms to the keeping quality and storage life of the product. Since the locker industry has grown so rapidly, it was felt there is need for further study on the effect of the bacterial flora upon the quality of such meats when frozen. In this study fresh pork sausage was used to determine the influence of bacteria upon the keeping quality.

The sausage was made from fresh pork trimmings composed of approximately 75 percent lean and 25 percent fat, and seasoned with 1 pound salt, 2 ounces pepper, and 2 ounces sage for each 50 pounds of meat. This formula is recommended by the Kansas Agricultural Experiment Station. Four trays of trimmings were prepared and designated as M, N, O, and P. Each tray of trimmings was made from pork carcasses which were aged in the cooler for varying lengths of time. The aging period allowed time for the bacterial flora common to each carcass to multiply.

The four blocks of sausage were prepared and placed in a 34°F. cooler for 24 hours due to packaging. T series of one pound packages was made from each block of sausage, using cellophane (MSAT87) with an outer wrapping of wax paper as the protective covering. Each series was frozen in an air blast freezer and stored at 0°F.

A bacterial count was made of the seasoning ingredients used in order to determine how many bacteria were added to the meat by the ingredients. It has been found that nearly all of the common spices contain large numbers of bacteria. Platings were therefore made of the black pepper, sage, and salt used in this study. The counts indicated the presence of 2,000,000 bacteria per gram in black pepper, 27,000 per gram in sage and 10 per gram in salt. When these ingredients are used in the ratio of 1 gram of seasoning to one pound of meat as indicated in the above formula, pepper was found to contribute 30,000 bacteria per gram of meat, sage 60 per gram and salt less than 1 per gram.

A study was made of the packaging materials used to determine