Ed Smith
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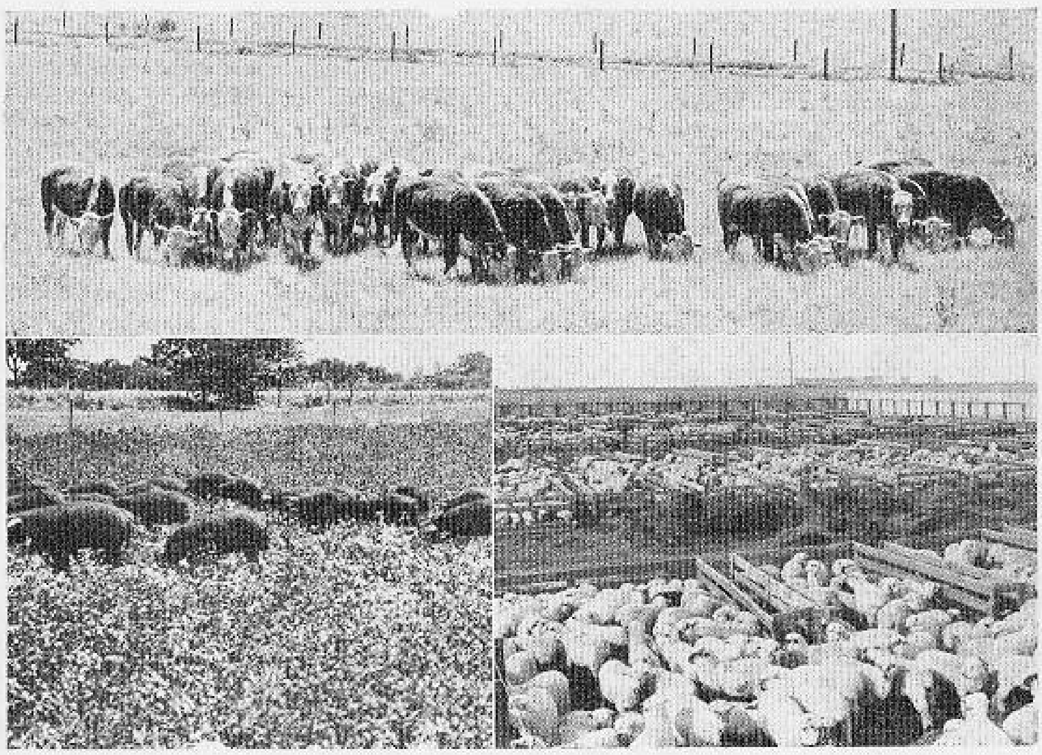
1946

THIRTY-THIRD ANNUAL

Livestock Feeders' Day

May 4, 1946



DEPARTMENT OF ANIMAL HUSBANDRY

Kansas Agricultural Experiment Station

Manhattan, Kansas

THIRTY-THIRD ANNUAL LIVESTOCK FEEDERS' DAY

Kansas State College
Manhattan, Kansas

Saturday, May 4, 1946

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8 - 10 a.m.	- Inspection of experimental livestock.
10 a.m.	- Forenoon Program - North Pavilion
Presiding	- Wayne Rogler, Matfield Green, Kansas President, Kansas Livestock Association

The Feed Situation
George Montgomery
Professor of Agricultural Economics

Feed Crops for Kansas - R. I. Throckmorton,
Head, Department of Agronomy

The World Food Situation - Milton S. Eisenhower,
President, Kansas State College

Trends in the Livestock and Meat Industry -
Col. E. N. Wentworth, Director
Armour's Livestock Bureau, Chicago, Ill.

Noon	- Luncheon sponsored by the Kansas Livestock Association and served by the Block and Bridle Club.
1:10 p.m.	- Afternoon Program - North Pavilion

Special Feature by the Campus Cow Girls
Ruth Fenton, Patt Fairman and Joyce Crippen

Presentation of Kansas Beef Production Contest
Winners - Phil Ljungdahl, Extension Animal
Husbandman and Walter H. Atzenweiler,
Agricultural Commissioner, Chamber of
Commerce, Kansas City, Missouri.

Results of Beef Cattle Feeding Investigations -
A. D. Weber, Head, Department of Animal
Husbandry, and F. W. Bell, Professor of
Animal Husbandry.

Highlights of Recent Lamb Feeding Investigations -
Rufus F. Cox, In Charge of Sheep Investigations.

Pointers on How to Produce True-breeding Herds
of Polled Herefords or Shorthorns -
H. L. Ibsen, Professor of Genetics.

Results of Swine Feeding Investigations -
C. E. Aubel, In Charge of Swine Investigations.

Question Box

THE WORLD FOOD SITUATION

Milton S. Eisenhower
President, Kansas State College

(Abstract)

Europe, which normally imports about ten percent of its food supply, has not as yet been able to get its own production back to normal. With transportation facilities not yet in order, with fertilizers short, with seed supplies inadequate and the labor supply disrupted, Europe has in addition had to contend with unfavorable weather. North Africa, which normally ships large quantities of grain and other farm products to Europe, suffered one of the worst droughts in its history last season.

The result of these circumstances is that millions in Europe are now on the verge of starvation. In the area between Russia and the English channel, 170 million people are hungry. A good many millions in cities are getting less than 1,500 calories a day and many of these are fortunate to have 1,000 calories a day -- less than a third of the amount each of us consumes each day.

The relief task ahead of us is the most gigantic in modern history. The principal contribution each of us can make is simply to eat less so that either the European nations or the United Nations Relief and Rehabilitation Administration can obtain more from our channels of trade. The critical period is the next ninety days.

THE FEED SITUATION

George Montgomery
Department of Agricultural Economics
Kansas Agricultural Experiment Station

(Abstract)

Supplies of Feed Grains.

The feed grain situation will become increasingly tighter.

Harvesting of new crop small grains will relieve the situation somewhat, but corn will be extremely scarce until October.

Farm stocks of corn on April 1 were 253 million bushels less than a year earlier, and were the smallest April 1 stocks in eight years.

Use of feed grain so far this season has been extremely heavy. During October, November and December the use of feed grain for livestock was nearly 10 percent larger than a year earlier.

In the first three months of 1945, the disappearance of corn from farms was 859 million bushels compared with 796 during the same months in 1945, and a 10 year average of 533 millions. We have only 1072 million bushels on farms to last for the next six months and provide carryover at the end of the season.

Wheat and imported grains will not be available to overcome shortage of corn as in 1943 and 1944.

Prices.

Feeding ratios will be less favorable than in recent years.

If ceilings are continued, feed grain prices will remain at the maximums even if the new corn crop is large.

If ceilings are removed, corn prices would rise sharply. Commercial demand would draw grains away from feeders.

By Product (Protein) Feeds.

Production of by-product feeds has been near record levels but supplies have been extremely scarce.

Supplies for balance of this season are expected to be smaller than during the corresponding period of the last three seasons.

Output of wheat mill feeds will be one-third smaller.

Output of cottonseed cake and meal will be below last year.

Farm stocks of soybeans are slightly larger than a year ago, but one-fourth smaller than two years ago, but are being held tightly.

Use of protein feeds so far this season has been larger. A smaller than normal portion of the total supply remains for the balance of the season.

Prices of protein feed will be higher if controls are removed.

Longer Time Outlook.

Livestock numbers are being adjusted downward.

Demand for meat and livestock will remain high.

Feed will not be available in normal supply unless 1946 production is large.

Prices will be higher if controls are removed.

FEED CROPS FOR KANSAS

R. I. Throckmorton, Head
Department of Agronomy, Kansas State College

Plant breeders have made much progress during the last few years in improving feed crops from the standpoint of adaptation to environmental conditions and to harvesting with the combine and mechanical corn picker. There is still much to be done but the progress that has been made is encouraging.

Since, with the exception of wheat, the crops receiving most of the attention of plant breeders are consumed by livestock, the agronomists and livestock men must work together to determine the production capacity and characteristics of the crop in the field, and the palatability and feeding value in the lot of new varieties as they are developed. This system is followed here at the central station and at the branch stations.

Although it is too early in the season to predict the feed crop situation for the season of 1946-47, there are definite indications that the supply of feed grains will be much lower than they were for the season of 1945-46. In a survey of conditions in central and western Kansas as of April 1, 1946, there were only 15 counties of the 67 reporting that indicated grain feed supplies will be carried over for use next winter. A year ago in this same area there were 57 counties that reported there would be a carry-over of grain feed supplies. In addition to this reduction in the carry-over of grain feed supplies, there is also much less forage being carried over this year than was carried over the summer of 1945.

In addition to the reduction in grain and forage feed reserves, soil moisture reserves are, in general, much less than they were in the spring of 1945. Thus feed reserves are lower than they were a year ago, and present prospects for production are lower than they were a year ago. These factors mean there is need this year to use the best production methods, to use the best adapted varieties, and to stabilize grain feed production as much as possible by growing at least some grain sorghums, and to conserve grain feed supplies by making maximum use of grasses for grazing. They also mean that more stress than usual should be given to the production of grain sorghums because of their dependability.

COMBINE TYPES OF GRAIN SORGHUMS

The combine types of grain sorghums have come into strong favor because of ease of harvesting. They are well adapted to central and western Kansas conditions but are not so well adapted to eastern Kansas. In the first place, all of the combine types are derivatives of milo and are highly susceptible to chinch bug injury. The combine types are low-growing, provide relatively little shade and, therefore, do not compete as well with weeds as do the taller growing varieties of grain sorghum. Frequently, in eastern Kansas, climatic conditions are not favorable for the grain to become sufficiently dry for safe storing if the crop is harvested with the combine. During favorable seasons the combine types will not produce as high yields as will the standard varieties of kafir in eastern Kansas. The combine types produce only a limited amount of forage and, therefore, are of value primarily for grain production.

It is evident that there is need for a combine type of grain sorghum, similar to kafir in its characteristics, for production in eastern Kansas. Progress is being made in developing such a variety but the task is difficult. Previous to the development of such a variety, most growers in eastern Kansas who desire a dependable grain feed crop, will do well to continue with the adapted varieties of kafir.

In those areas where existing combine types are adapted, and in other areas if they are to be grown, and in the production of kafir, much attention should be given to the preparation of the seedbed. A warm, fine soil and a lack of weed competition are essentials in combine sorghum production. The soil should be disked frequently enough previous to planting to kill all weeds and to form a fine condition of the surface layer. When the crop is planted with the lister, the furrows should be shallow in order to place the seed in warm soil. Planting with the surface planter equipped with disk furrow openers is preferable to listing on most soils in the eastern one-half of Kansas. Relatively light planting, as at the rate of four pounds of seed per acre in eastern Kansas and two pounds per acre in western Kansas, is preferable to heavier rates. The seed should always be treated with one of the good seed-treating products to assist in insuring a good stand. Planting with the grain drill in close rows is not practical under most conditions because of weed competition.

VARIETIES OF COMBINE SORGHUMS

Westland, the most commonly grown variety of the combine types in Kansas, has its best adaptation in central and southwest Kansas. If a combine type is to be grown in eastern Kansas, Westland would be preferable to most other varieties in the area south of the Kansas River. The grain resembles that of yellow milo and is quite palatable. The stalks are short and sturdy, which makes the variety resistant to lodging. Since this variety is resistant to the milo disease, it is preferred to all susceptible varieties for southwest Kansas.

Martin is a high yielding, stiff stalked combine type that has become popular during the last few years. The only objection that has been raised to this variety for the central and southern parts of the state is that it may lack palatability.

Midland is mid-early, maturing in 95 to 105 days. It is somewhat taller than Wheatland and Martin and can be harvested with the combine or row-crop binder. Midland has high resistance to lodging, being one of the most sturdy of the combine types. The stalks are somewhat juicy and the standing stover is relished by cattle when pastured, thus giving the variety added value. The region of adaptation of Midland is between Westland to the south and Colby to the northwest.

Colby is one of the shortest of the combine types and is earlier than Westland, Martin and Midland. It is adapted to northwest and north central Kansas where its earliness is an advantage. It will not produce as high yields as the other varieties farther south.

If a combine type of grain sorghum is to be grown north and east from Manhattan, except in the northwest section of the state, the Midland variety would be preferable to others. South and east from Manhattan, the Martin or Westland variety would be preferable, but the possible lower palatability of Martin should be considered.

ADAPTED VARIETIES OF KAFIR

The varieties of kafir adapted to central and eastern Kansas are so well known that lengthy discussions relative to them are not necessary.

Western Blackhull is one of the earliest maturing varieties of kafir. It is well adapted to central Kansas and is one of the better varieties for eastern Kansas. It is preferable to the standard variety of Blackhull kafir in northeast Kansas and on the thinner upland soils in the southeast and east central sections. It is relatively resistant to chinch bug injury. Although Western Blackhull grows to a height of only 4 to 5½ feet, it is not well adapted for harvesting with the combine.

Blackhull kafir is relatively late in maturing and is well adapted to the bottomlands and more fertile uplands in southeast Kansas and as far west as Reno County. This variety is relatively resistant to chinch bug injury.

Pink kafir is still a good variety for both grain and forage production in central and eastern Kansas.

FORAGE CROPS

Atlas sorgo continues to be the most popular forage sorghum for the eastern one-third of Kansas although it may be grown on the bottom-land soils farther west. Atlas has lost some of its popularity during the last few years because seed of some strains having a dry, pithy stalk has been planted and the resulting crop was disappointing for forage purposes. However, seed of the sweet, juicy types of plants is available.

Norkan is a white seeded and sweet and juicy stalked variety. It has high grain producing capacity for a sweet sorghum but when grain production is high, the sugar content of the stalks is low and the forage will not equal that of either Atlas or Early Sumac. Norkan is adapted to northern and western Kansas where Atlas will not mature.

Early Sumac is a good quality, early maturing forage sorghum. It is adapted to northern and western Kansas and is one of the best varieties to plant for the production of sorghum hay.

A new variety of sorgo has been approved for distribution. Thus far it does not have a name. It is similar to Atlas in all respects except that it is earlier and does not grow as tall as Atlas. It has a stiff stalk. Seed should be available in limited quantities by 1947.

HYBRID CORN

The open-pollinated varieties of corn, as Pride of Saline, Midland, Reeds, and Hays Golden, continue to be popular in many sections of Kansas but they are gradually being replaced by hybrids. Thus far we do not have a hybrid that is adapted to northwest Kansas but there are good hybrids for the corn producing sections of eastern and central Kansas.

NEW OAT VARIETIES

Two new varieties of oats that will mean much to the oat-producing sections of the state are being increased on a relatively large acreage this year. These varieties are Osage and Neosho. Both are high yielding, good quality varieties and have combined resistance to the common races of the smuts and rusts of the area. Both varieties have exceptionally stiff straw and will stand up for combining. It is thought that these two varieties will make the oat crop more popular than it has been in recent years.

Osage has short, stiff straw, produces yellow grain, and will mature at about the same time as Kanota. It is perhaps better adapted to the northern portion of the oat-growing sections of Kansas than is Neosho.

Neosho produces grain of a light red color and good test weight. It matures slightly later than Kanota and will probably have its best adaptation in the southern portion of the oat-growing section of Kansas.

BUFFALO ALFALFA

One of the major difficulties in alfalfa production in the eastern one-half of Kansas is that of maintaining stands. Bacterial wilt of alfalfa has become widely distributed and there is no known soil treatment that will control it.

Buffalo alfalfa has high resistance to the disease and as soon as seed supplies become abundant it will aid materially in overcoming one of our major problems in alfalfa production. Buffalo alfalfa is similar to Kansas Common in every respect except disease resistance. The two varieties yield at about the same rate and have approximately the same resistance to low temperatures although Buffalo may be slightly more cold-resistant.

TRENDS OF THE LIVESTOCK AND MEAT INDUSTRY

by

Colonel Edward N. Wentworth
Director, Armour's Livestock Bureau
Chicago 9, Illinois

In the face of a world food shortage American meat production is declining. On January first of this year we had twenty-one million less hogs on farms than we did two years earlier, and we had a million and a half less cattle. The peak in these two species was reached in 1944, but the peak in sheep production was reached at the beginning of the war - January 1, 1942. This January we had twelve and a half million less sheep than we did four years earlier.

It has been claimed that declines in population on the first of the year do not imply an actual decline in meat production. In other words, if we are headed into a period where smaller national herds can supply us, we can temporarily supplement normal slaughter by liquidating surplus breeding stock.

In the case of cattle and sheep this is very definitely what has occurred. Since we reached the peak in cattle production we have been slaughtering four and a half to five million more head per year, under federal inspection, than we slaughtered when the national herd was being built up. Cattle population has been reduced approximately a million and a half head since the peak so that it means the annual productivity of our herd has increased three to three and a half million head.

During the last four years we have been slaughtering an average of four million more sheep and lambs annually than we did at the pre-war rate. Concurrently population has been declining at the rate of three million head a year, so that we can estimate that the yearly productivity of our national flock has increased something over a million head.

In the case of hogs, federal inspected slaughter dropped from 69 million in 1944 to about 41 million in 1945. Most of this decline represents liquidation, but we are currently running behind the 1935-44 average for hog slaughter. For the first seven months of the current production year we have been about two percent below. Ideas differ, however, as to whether this decrease depends entirely on reduced breeding herds, or on the diversion to the black market, or to reduced efficiency.

From a consumer's viewpoint the important thing is that during the last seven months cattle slaughter is 22.3 percent above the 1935-44 average; calf slaughter is 17.2 percent above; and sheep and lamb slaughter is 26.4 percent above. This increased slaughter has come from a hog population that is 12.7 percent greater and a cattle population 12.3 percent greater, but the sheep population is nearly 20 percent smaller. It therefore becomes obvious that we are cutting into our national livestock herds to a point well below pre-war relations, if current trends continue.

The chief factor in this reduction is political rather than economic. A demand exists which should stimulate ample production but it is held in check by government regulations which not only reduce livestock, but which also serve to stimulate the diversion of meat from the regular channels. Hence the question is very difficult to discuss because political answers do not apply to economic questions any better than sound economic responses answer political questions. Wherever politics is concerned emotions are involved and, wherever economics is concerned, solutions are unsound if emotions come into the question at all.

The chief difficulty with our meat supply is that we are trying to hold in check a demand that will pay far greater prices than those established by OPA ceilings. Furthermore the supply in relation to that demand is short enough that all the product we have would move at prices eight to fifteen cents a pound higher than the retail ceilings on the basis of ordinary relationships. In other words, the consumer demands price ceilings for protection, but will actually go out and spend more money to get what he wants outside the legal channels. So no matter what opinions and theories are, the actual spending of money speaks louder than the protests of housewives about the cost of living, or the complaints of diners in restaurants and hotels. In the meat industry if the price paid by the consumer did not exceed the established ceilings, meat would never have been diverted from normal channels into the black markets.

The greatest problem in the maintenance of ceilings for the benefit of the consumer is that no incentive is offered to overcome current shortages. Prices normally come into balance at a level where the consumer will take all the supplies offered. This level is far above the artificial one established by price controls today. In the past, the only way in which production of meat could be increased was by making it profitable for the stockman to grow more animals, and the levels at which price ceilings are established do not offer this incentive. Prices of livestock meat are high enough in relation to pre-war prices, but they are far too low in relation to feed costs, labor costs, taxes, transportation, and all the other demands placed on the livestock producer and processor. Hence as long as ceilings remain under the level where it is advantageous for the producer to increase his livestock, the shortage will continue and the entire industry will be out of balance.

Just where will the livestock population settle when we get back to so-called normal conditions? Research reveals that there is a close association between the total amount of money which people receive - the national income - and the amount that they will pay for meat. On the average they spend for meat about five to six percent of their income. The percentage runs highest in years of low income - when most of the money has to be spent for essentials - and lowest in years of high income when it is possible to buy luxuries. In 1941 before rationing and ceilings prevented the free operation of the price mechanism, the national income was approximately 97 billion dollars, and people spent 5.7 percent of their income for meat. During the panic year of 1908 the national income was only about 20 billion dollars, and 6.75 percent was spent for meat. A direct comparison of dollars means little, for the purchasing power differed too greatly, but the percentage comparison is appropriate.

Several theories have been used in trying to translate these ideas of percentage of income to probable livestock population. Some of those who have attempted to study the rate of unemployment have tried to figure what the livestock population should be according to whether we have two million unemployed (our previous minimum), or seventeen million (the maximum estimate under postwar needs), or some point in between. This of course is merely an interesting calculation because employment and unemployment vary much more quickly than the size of breeding herds can vary, based on the long-time planning essential for livestock production.

A sounder basis for examining the future is the idea that from now henceforward the consumer will have the upper hand. In relation to the pressure for maintaining price ceilings, this theory is entitled to considerable respect, for more people are interested in spending less money for essentials - and more for luxuries - than are interested in stimulating the production of meat and other foods by increasing prices. Consequently we may expect conditions that artificially create shortages to remain longer than sound judgment would warrant. We may even expect a demand for the importation of foodstuffs from other countries. This was what occurred in England when the urban forces gained control over the rural, and it was the case way back over history in Rome, Spain, and other of the world empires.

Another theory that gets considerable attention among agriculturists is the idea that we are limited by the feedstuffs we can produce. They point to the fact that war intensifies the natural shortages that are barely glossed over under peace conditions, and indicate that the protein shortages we first endured, then the occupation of the grass, and now the shortage of cereals, point directly to a definite restriction of our livestock population in the future. It is easy to say that none of these are permanent, but the idea may be sound basically.

Two theories exist which suggest that in the long run livestock populations may increase in proportion to human. One is that improved technology, such as quicker turnover in livestock, labor saving devices, higher yielding feed crops, more efficient feed utilization, etc., will make it possible for us to improve the rate of meat consumption. The other theory is based on the preservation of the so-called parity relationships. Removing the emotion from the discussion, it is obvious to any statistician that parity as written under the law has been based on a period when livestock prices occupied relations more favorable than average - namely, the years 1909 to 1914. Consequently, if livestock prices are held by artificial regulation to these relationships, numbers will probably increase more than the normal demand would stimulate. Hence many people believe that the application of the parity theory for many years would put our livestock population in excess of our consumer requirements.

These theoretical considerations are interesting but someone may ask just what do they mean in figures? Frankly, I do not know, but current ideas seem to indicate that if the normal relations of livestock population to human population are conserved we should have about seventy-five to seventy-seven million cattle (beef and dairy combined) on the basis of a hundred and forty million people. Similarly we should find a demand for about sixty to sixty-five million sheep. Swine, of course, are affected by our export trade, and sheep are restricted by the surplus wool situation. However, these figures come as near as anything to representing the target towards which we must shoot. This should indicate a slightly continued reduction in cattle, a slight reduction in hogs, and a relatively large increase in sheep and lambs.

In closing one must figure some of the trends in relation to the consumer. The war has shown the potential meat consumption of the average American when he has sufficient income. Inherently there is no reason except the relative value of meat in comparison with the value of the products provided by the rest of the population why people should not eat all the meat they want. Unfortunately, the high costs of other products in relation to agriculture throw this out of balance and it becomes obvious that consumers will never eat all the meat they would desire.

Hence the steps in the future that will increase the efficiency of getting meat to the consumer and increase the efficiency of livestock production are of greatest importance. Some of the new developments in the frozen food field, in the packaged meat field, and in the variety products are indicative of the trend. All of these moves are sufficiently in their infancy that we do not know their potentialities. But the indications are that the problem of average meat consumption per capita is not a static one - there is hope for greater outlets and more extensive production on American farms and ranges. Once the political questions and the so-called social questions that we are enduring in this period of reconversion clarify, the future for the stockman and for the meat industry in general should brighten.

INFLUENCE OF WINTER RATIONS UPON RETURNS FROM WINTERING, GRAZING, AND FULL FEEDING YEARLING STEERS

A. D. Weber

Introduction

Systems of beef production which utilize roughage and grass are particularly adapted to Kansas conditions. Purchasing steer calves or yearling steers in the fall, wintering on silage, hay, fodder, dry grass, wheat pasture, or brome grass pasture, or a combination of these feeds, plus a protein concentrate where needed, and then grazing 4 or 5 months, is a system followed by many successful cattlemen. In some instances, after having been wintered and grazed in this manner, yearling or two-year-old steers are given a short feed for the fall or early winter market.

Details of this system and modifications of it need to be further delineated and tested so that the performance of cattle fed different feeds and handled in different ways can be predicted with greater accuracy. This feeding trial was planned with that objective in mind.

The primary purpose of this experiment was to test the value of prairie hay in a ration for wintering yearling steers. The quantity of prairie hay available for cattle feeding in Kansas has increased greatly in recent years due to the declining horse population. Because of this trend, it is planned to continue these studies of prairie hay for several years to determine how it can be used to the best advantage.

Experimental Procedure

Prairie hay, Atlas sorgo silage, and a combination of these roughages were compared when supplemented with one pound of cottonseed meal per steer daily (Lots 1, 2 and 4). A test was also made to determine whether one or two pounds of cottonseed meal should be used as a supplement to prairie hay (Lots 2 and 3).

No. 1 prairie hay and Atlas sorgo silage of excellent quality were fed. The cottonseed meal contained 39.6 per cent protein. Both prairie hay and silage were full fed. A limited quantity of prairie hay was wasted. Range-bred Hereford yearling steers were used. They graded good to choice as feeders.

The test rations were fed only during the wintering period. All five lots of steers were grazed together for 128 days, after which they were allotted the same as in the wintering period and full fed on the same feeds for 85 days. Thus the total gains made during the wintering, grazing and full feeding periods are an indication of the relative values of the rations fed during the wintering period.

Credit is due F. W. Bell for weighing and allotting the steers used in this experiment.

EHSmith

Observations

1. These yearling steers consumed approximately 7 pounds of silage per 100 pounds live weight. About three pounds of silage were equal to 1 pound of prairie hay in satisfying the steers' appetite for roughage, irrespective of whether the silage was fed alone or in combination with the prairie hay.

2. The steers fed prairie hay plus one pound of cottonseed meal gained only 46 per cent as much during the wintering period as those fed silage plus one pound of cottonseed meal (Lots 1 and 2). The silage-fed steers appeared thriftier and carried more flesh than those fed prairie hay. However, the steers wintered on silage gained only 47 per cent as much during the summer as those wintered on prairie hay. While the pasture gain tended to be inversely proportional to the winter gain, the advantage was not enough in the case of the steers wintered on prairie hay to overcome the larger winter gain of the silage-fed steers.

3. The steers fed silage as the only roughage made slightly more winter gain than those fed silage plus prairie hay, but the opposite was true for summer gain with the result that at the close of the pasture season the lot wintered on both silage and prairie hay had a slight advantage in total gain. During the full feeding period the steers that had been wintered on silage alone again took the lead. It is evident, therefore, that there was no advantage from feeding a dry roughage with silage. This is in accordance with the results of previous tests. It should be noted, however, that steers fed silage as the only roughage seem to crave dry feed even though their gains are not increased when it is fed (Lots 1 and 4).

4. Two pounds of cottonseed meal produced considerably better results than one pound of cottonseed meal as a supplement to prairie hay, on the basis of the results obtained in all three phases of this experiment. At the end of the wintering phase, the extra pound of cottonseed meal fed in Lot 3 had increased the gain 0.38 pound. But during the grazing phase, the Lot 2 steers made the larger gain, since they had gained less than Lot 3 during the winter. As a consequence, at the end of the grazing season, the increased gain attributable to feeding the extra pound of cottonseed meal in Lot 3 had been reduced to 0.24 pound. Gains during the full feeding period were approximately the same.

5. At the prices charged for feeds in this experiment, prairie hay was definitely inferior to silage. However, these prices are of value primarily as a historical record and are indicative of the feed situation during the winter of 1944-45. Current prices of feed and steers should always be used when comparing rations and evaluating systems of beef production.

6. The over-all results for each lot in this experiment should be of particular interest to cattlemen having roughage, grass and a limited quantity of grain to feed to beef cattle. The table summarizing the results of all three phases merits special study. Each lot was fed only 27 bushels of grain per steer, yet the average total gains were 536, 508, 551, and 526 pounds for Lots 1, 2, 3 and 4 respectively.

INFLUENCE OF WINTER RATIONS UPON RETURNS FROM WINTERING, GRAZING, AND FULL FEEDING YEARLING STEERS

A. D. Weber

Phase I - Wintering, November 8, 1944 to April 25, 1945 - 168 days

1. The relative values of prairie hay, Atlas sorgo silage and a combination of these roughages.

2. One pound versus two pounds of cottonseed meal as a supplement to prairie hay.

1 - Lot number	1	2	3	4
2 - Number of steers in lot	10	9	10	10
3 - Average daily winter ration:				
Atlas sorgo silage	49.33	....	....	30.88
Prairie hay	....	16.91	16.78	6.95
Cottonseed meal	1.00	1.00	2.00	1.00
4 - Weight per steer at beginning of wintering phase	611.0	607.0	610.0	609.0
5 - Weight per steer at end of wintering phase	833.0	709.0	777.0	827.0
6 - Gain per steer, wintering phase	222.0	102.0	167.0	218.0
7 - Daily gain per steer, wintering phase	1.32	0.61	0.99	1.30
8 - Feed cost per steer - wintering phase	$ 25.75	$ 26.34	$ 31.21	$ 26.76
9 - Cost of feed per 100 pounds gain - wintering phase	11.60	25.82	18.69	12.28
10 - Initial cost per steer at 13½ cents per pound	82.49	81.95	82.35	82.22
11 - Initial cost per steer plus winter feed cost	108.24	108.29	113.56	108.98
12 - Necessary selling price per cwt. to cover initial cost plus wintering cost	12.99	15.27	14.62	13.18

FEED PRICES: Silage, $5 per ton; Prairie hay, $15 per ton; Cottonseed meal, $60 per ton; Ground shelled corn, $1.12 per bushel.

INFLUENCE OF WINTER RATIONS UPON RETURNS FROM WINTERING, GRAZING AND FULL FEEDING YEARLING STEERS

A. D. Weber

Phase II - Grazing, April 25, 1945 to August 31, 1945 - 128 days

1. The relative values of prairie hay, Atlas sorgo silage and a combination of these roughages.

2. One pound versus two pounds of cottonseed meal as a supplement to prairie hay.

13-Lot number	1	2	3	4
14-Number of steers in lot	10	9	10	10
15-Weight per steer at beginning of grazing phase	833.0	709.0	777.0	827.0
16-Weight per steer at end of grazing phase	925.0	905.0	949.0	926.0
17-Gain per steer, grazing phase	92.0	196.0	172.0	99.0
18-Daily gain per steer, grazing phase	0.72	1.53	1.34	0.77
19-Cost of grazing per steer	$ 12.00	$ 12.00	$ 12.00	$ 12.00
20-Cost of 100 pounds of pasture gain	13.04	6.12	6.98	12.12
21-Initial cost per head fall 1944 plus wintering cost 1944-45, plus grazing cost 1945	120.24	120.29	125.56	120.98
22-Necessary selling price per cwt. at home to cover original cost plus wintering and grazing costs	13.00	13.29	13.23	13.06

INFLUENCE OF WINTER RATIONS UPON RETURNS FROM WINTERING, GRAZING, AND FULL FEEDING YEARLING STEERS

A. D. Weber

Phase III - Full feeding, August 31, 1945 to November 24, 1945 - 85 days

(Allotment the same as in Phases I and II)

23-Lot number	1	2	3	4
24-Average daily ration:				
Ground shelled corn	17.68	17.93	17.75	17.04
Cottonseed meal	0.58	0.61	0.59	0.58
Prairie hay	1.48	1.58	1.37	1.35
Alfalfa hay	6.02	6.61	6.13	5.92
25-Weight per head at beginning of full feeding phase, August 31	925.0	905.0	949.0	926.0
26-Weight per head at end of full feeding phase, November 24	1147.0	1115.0	1161.0	1135.0
27-Gain per head - full feeding phase	222.0	210.0	212.0	209.0
28-Daily gain per head - full feeding phase	2.61	2.47	2.49	2.46
29-Full feeding cost per steer	$ 37.60	$ 38.67	$ 37.77	$ 36.34
30-Cost of feed for 100 pounds of gain - full feeding phase	16.94	18.41	17.82	17.39
31-Selling weight per steer at Kansas City, November 27	1096.0	1060.0	1098.0	1070.0
32-Shrink in Transit:				
Pounds per steer	51.0	55.0	63.0	65.0
Per cent	4.4	4.9	5.4	5.7
33-Shipping and selling expenses per steer	$ 3.97	$ 3.84	$ 3.98	$ 3.88
34-Initial cost per steer fall 1944, plus wintering cost 1944-45, plus grazing cost 1945, plus full feeding cost 1945, plus shipping and selling expenses	161.81	162.80	167.31	161.20
35-Necessary selling price per cwt. at Kansas City to cover costs listed above	14.76	15.36	15.24	15.07
36-Selling price per cwt. at Kansas City	16.75	16.75	16.75	16.75
37-Selling price per steer at Kansas City	183.58	177.55	183.92	179.23
38-Margin per steer above costs listed in Line 34	21.77	14.75	16.61	18.03
39-Dressing percentage	58.6	56.9	58.5	59.7
40-Carcass grades:				
Choice (AA)	3	6	4	9
Good (A)	7	3	6	1

FEED PRICES: Ground shelled corn, $1.12 per bushel; Cottonseed meal, $60 per ton; Prairie hay, $15 per ton; Alfalfa hay, $20 per ton.

INFLUENCE OF WINTER RATIONS UPON RETURNS FROM WINTERING, GRAZING, AND FULL FEEDING YEARLING STEERS

A. D. Weber

Summary of Phases I, II and III - November 8, 1944 to November 24, 1945
381 days

1-Lot number	1	2	3	4
2-Initial weight per steer	611.0	607.0	610.0	609.0
3-Feed consumption per steer:				
Phase I - Wintering				
Silage - tons	4.14	...	...	2.59
Prairie hay - tons	...	1.42	1.41	0.58
Cottonseed meal - pounds	168.00	168.00	336.00	168.00
Phase II - Grazing				
Bluestem pasture - acres	5	5	5	5
Phase III - Full feeding				
Ground shelled corn - bushels	26.84	27.22	26.94	25.86
Cottonseed meal - pounds	49.30	51.85	50.15	49.30
Prairie hay - tons	0.06	0.07	0.06	0.06
Alfalfa hay - tons	0.26	0.28	0.26	0.25
Total Phases - I, II and III				
Silage - tons	4.14	...	...	2.59
Prairie hay - tons	0.06	1.49	1.47	0.64
Alfalfa hay - tons	0.26	0.28	0.26	0.25
Gr. shelled corn - bushels	26.84	27.22	26.94	25.86
Cottonseed meal - pounds	217.30	219.85	386.15	217.30
Bluestem pasture - acres	5	5	5	5
4-				
Gains per steer:				
Phase I - Wintering	222.0	102.0	167.0	218.0
Phase II - Grazing	92.0	196.0	172.0	99.0
Phases I and II	314.0	298.0	339.0	317.0
Phase II - Full feeding	222.0	210.0	212.0	209.0
Phases I, II and III	536.0	508.0	551.0	526.0
5-Final weight per steer	1147.0	1115.0	1161.0	1135.0
6-Necessary selling price per cwt.				
At end of winter phase	$ 12.99	$ 15.27	$ 14.62	$ 13.18
At end of grazing phase	13.00	13.29	13.23	13.06
At end of full feeding phase	14.76	15.36	15.24	15.07

INFLUENCE OF WINTER RATIONS FED TO STEER CALVES UPON RETURNS FROM WINTERING, GRAZING AND FULL FEEDING

A. D. Weber and F. W. Bell

Phase I - Wintering, January 17, 1946 to April 27, 1946 - 100 days

1. The relative values of prairie hay, Atlas sorgo silage and combinations of these roughages.

2. One pound versus two pounds of cottonseed meal as a supplement to prairie hay.

1-Lot number	1	2	3	4	5
2-No. of steers in lot	10	10	10	10	10
3-Average daily ration:					
Atlas sorgo silage	31.28	...	...	15.36	22.86
Prairie hay	...	14.04	14.08	6.84	3.60
Cottonseed meal	.99	.99	1.91	.99	.99
4-Average initial weight	516	516	514	514	514
5-Average final weight	609	624	645	619	613
6-Average gain	93	108	131	105	99
7-Average daily gain	.93	1.08	1.31	1.05	.99
8-Winter feed cost per steer	10.79	12.80	15.59	11.60	11.21
9-Cost of feed per 100 pounds gain	$ 11.60	$ 11.85	$ 11.90	$ 11.05	$ 11.32
10-Initial cost per steer at 15 cents per pound	77.40	77.40	77.10	77.10	77.10
11-Initial cost per steer plus feed cost	88.19	90.20	92.69	88.70	88.31
12-Necessary selling price per cwt. to cover initial cost plus feed cost	14.48	14.46	14.37	14.33	14.41
13-Appraised value per cwt. May 4, 1946					

FEED PRICES: Silage, $5 per ton; Prairie hay, $14 per ton; Cottonseed meal, $60 per ton.

Observations

This is the second feeding trial conducted at the Kansas Agricultural Experiment Station to test the value of prairie hay in a ration for wintering stock cattle. All five lots of steer calves will be grazed together during the summer of 1946. If conditions permit next fall they will be allotted the same as in the 1946 wintering period and fed the same rations again during the winter of 1946-47. Then they will be grazed together in 1947, after which they will be allotted the same as in previous phases and full fed for about 90 days. Rate and efficiency of gains for the various wintering, grazing and full feeding periods will be considered in measuring the influence of winter rations on final returns.

FATTENING YEARLING HEIFERS FOR THE SUMMER MARKET

Experiment I - 1944-45

A. D. Weber

Introduction.

In tests conducted at the Kansas Agricultural Experiment Station previous to the one reported herein, it was found that heifer calves fed 4 to 5 pounds of grain per head daily during the winter were too fleshy to turn on pasture, hence they could not be used advantageously for deferred full feeding in accordance with the system developed for steer calves. It may be noted in this connection that the standard system approved for good and choice steer calves consists of three phases: (1) producing 225 to 250 pounds of gain during the winter, which usually necessitates the feeding of 4 to 5 pounds of grain per head daily; (2) grazing 90 days without grain; and (3) full feeding 100 days in a dry lot.

On the other hand, it was demonstrated that satisfactory results may be expected when heifer calves are wintered well but fed no grain, then grazed 90 days without grain, and finally, full-fed 100 days in a dry lot for the November market. Thus by taking into account the tendency of heifers to fatten more readily than steers, a modified system of deferred full feeding was developed for heifer calves.

Since the heifer calves fed 4 to 5 pounds of grain per head daily during the winter in these earlier tests were too fleshy for the standard system of deferred full feeding, they were full fed in a dry lot for 50 days beginning about May 1. While the results were reasonably satisfactory, the question immediately arose as to the quantity of grain that heifer calves should receive when they are to be fattened in dry lot for the summer (June to September) market. Considerable interest also developed among cattlemen concerning the influence of a low-protein winter ration on ultimate returns from heifers handled in this manner.

The test reported herein was planned with these problems in mind. It is hoped to develop a standard system of fattening heifers for the summer market without the use of pasture. When a satisfactory dry-lot system has been developed, it will be used as a check in developing a system of fattening heifers for the summer market which includes brome grass pasture.

Experimental Procedure

Detailed results of the test completed in 1945 are given in the tables which follow. It will be noted that each lot received a full feed of silage and one-tenth pound of ground limestone per head daily during the wintering phase. Ground shelled corn and cottonseed meal were fed as follows per heifer daily: Lot 1, corn, full feed; cottonseed meal, 1½ pounds; Lot 2, corn, one-half feed; cottonseed meal, 1½ pounds; Lot 3, corn, 3 pounds, no cottonseed meal; Lot 4, no corn, cottonseed meal, 3 pounds; Lot 5, no corn, cottonseed meal, 1½ pounds.

On April 19, 1945 at the close of the 140-day wintering period, Lot 1 was continued on a full feed of grain and Lots 2, 3, 4 and 5 were gradually brought to a full feed. Each lot was marketed after having reached an average weight of approximately 850 pounds per heifer. Marketing information and slaughter data were obtained for each lot.

Observations

1. At the close of the wintering period, the heifers in Lot 1 were fatter than those in any of the other lots. There was considerable trouble with foot rot during the winter, particularly in Lot 1, which may have retarded gains somewhat.

2. The heifers in Lot 2 performed satisfactorily during the wintering phase. On the other hand, the Lot 3 heifers, fed silage, 3 pounds of corn and one-tenth pound ground limestone, had very poor appetites while on this ration, especially toward the end of the wintering phase, and they made unsatisfactory gains. Their hair was harsh and they appeared to be unthrifty.

3. The Lot 3 heifers made a remarkable come-back when cottonseed meal and alfalfa hay were included in their ration during the full feeding period.

4. The Lot 4 heifers, fed 3 pounds of cottonseed meal per head daily made significantly larger gains and more growth during the winter than those in Lot 3, fed a low-protein ration. However, there did not appear to be any particular differences between these two lots of heifers with respect to prominence of hips or smoothness of conformation.

5. The heifers in Lots 3 and 5 were in stocker condition at the close of the wintering period. Those in Lots 1 and 2 were much too fleshy to turn on pasture, while the Lot 4 heifers were on the border line in this respect.

6. Differences in dressing percentages, and carcass grades were too small to be significant hence it would appear that the lots had attained about the same degree of finish when marketed. Variations in selling price per cwt. apparently were due to fluctuations in market prices and not to differences in finish or quality.

7. The results of this test indicate that full feeding grain during the winter to heifer calves that are to be fattened for the summer market is not justified. Further tests are needed to determine how much grain and protein concentrate, if any, should be fed during the winter for best results. However, on the basis of total feeds consumed, especially grain; total gain; date marketed; and margin per heifer, the system represented by Lot 2, fed a half-feed of grain, appears to have an advantage over those represented by the other lots in this test.

Credit is due F. W. Bell for weighing and allotting the steers used in this experiment.

FATTENING YEARLING HEIFERS FOR THE SUMMER MARKET

Experiment I - 1944-45

A. D. Weber

Phase I - Wintering, November 30, 1944 to April 19, 1945 - 140 days

1-Lot Number	1	2	3	4	5
2-Number of heifers	10	10	10	8	10
3-Average daily ration:					
Ground shelled corn	9.17	4.60	2.82	....	....
Atlas sorgo silage	9.61	23.10	23.06	30.22	31.16
Cottonseed meal	1.50	1.50	....	2.86	1.50
Ground limestone	0.10	0.10	0.10	0.10	0.10
4-Average initial weight	456.50	456.25	457.50	457.19	456.75
5-Average final weight	698.50	682.00	558.50	642.50	626.50
6-Average gain	242.00	225.75	101.00	185.31	169.75
7-Average daily gain	1.73	1.61	0.72	1.32	1.21
8-Feed cost for 100 lbs. gain-wintering phase	$ 14.65	$ 12.14	$ 15.94	$ 12.27	$ 10.21
9-Corn consumed per heifer - bushels	22.93	11.50	7.05	...	...

Phase II - Full feeding, April 19, 1945 until marketed

10-Lot number	1	2	3	4	5
11-Number of days in Phase II	98	98	148	116	148
12-Average daily ration:					
Ground shelled corn	11.43	12.08	12.12	12.04	11.93
Cottonseed meal	1.49	1.43	1.32	1.43	1.31
Atlas sorgo silage	2.72	8.63	5.93	8.77	6.18
Alfalfa hay	0.85	0.80	1.25	1.07	1.25
Ground limestone	0.10	0.10	0.10	0.10	0.10
13-Average initial weight	698.50	682.00	558.50	642.50	626.50
14-Average final weight	855.00	852.00	870.00	865.63	861.50
15-Average gain	156.50	170.00	311.50	223.13	235.00
16-Average daily gain	1.60	1.69	2.10	1.92	1.59
17-Feed cost of 100 lbs. gain - full feeding phase	$ 18.12	$ 18.74	$ 14.73	$ 16.50	$ 19.31
18-Corn consumed per heifer - bushels	20.00	21.78	32.04	24.96	31.53

FEED PRICES: Ground shelled corn, $1.12 per bushel; Cottonseed meal, $60 per ton; Atlas sorgo silage, $5 per ton; Alfalfa hay, $20 per ton; Ground limestone, $20 per ton.

FATTENING YEARLING HEIFERS FOR THE SUMMER MARKET

Experiment I - 1944-45

A. D. Weber

Summary of Phases I and II

19-Lot number	1	2	3	4	5
20-No. heifers in lot	10	10	10	10	10
21-Date placed on test	11-30-44	11-30-44	11-30-44	11-30-44	11-30-44
22-Date taken off test	7-26-45	7-26-45	9-13-45	8-13-45	9-13-45
23-Date marketed	7-30-45	7-30-45	9-17-45	8-15-45	9-17-45
24-Duration of experiment - days	238	238	288	256	288
25-Total gain per heifer	399	396	413	408	405
26-Average final weight	855.0	851.0	870.0	865.6	861.5
27-Av. weight at market	833.0	820.0	840.0	831.3	828.0
28-Shrink in transit:					
Pounds per heifer	22.0	31.0	30.0	34.3	33.5
Percent	2.6	3.6	3.4	4.0	3.9
29-Total feeds consumed per heifer:					
Gr. shelled corn - bus.	42.93	33.28	39.09	24.96	31.53
Cottonseed meal - lbs.	355.00	355.00	196.00	566.00	403.00
Silage - tons	0.80	2.05	2.05	2.62	2.64
Alfalfa hay - lbs.	83.00	81.00	184.00	123.00	184.00
Gr. limestone - lbs.	24.00	24.00	29.00	26.00	29.00
30-Total feed cost per heifer	$ 63.80	$ 59.22	$ 62.04	$ 59.53	$ 62.73
31-Feed cost for 100 pounds gain	16.01	14.96	15.04	14.58	15.50
32-Initial cost per heifer at 11½¢ per lb.	52.50	52.47	52.61	52.58	52.53
33-Marketing expense per heifer	3.27	3.24	3.28	3.26	3.25
34-Initial cost plus feed cost plus marketing expense	119.57	114.93	117.93	115.37	118.51
35-Necessary selling price per cwt. at Kansas City to cover costs listed in Line 33	14.35	14.02	14.04	13.88	14.31
36-Selling price per cwt. at Kansas City	16.50	16.50	16.75	16.15	16.75
37-Selling price per heifer at Kansas City	137.45	135.30	140.70	134.25	138.69
38-Margin per heifer above costs listed in Line 33	17.88	20.37	22.77	18.88	20.18
39-Dressing percentage	60.00	60.60	60.10	60.40	60.40
40-Carcass grades					
Choice (AA)	10	10	10	6	6
Good (A)	--	--	--	2	4

FATTENING YEARLING HEIFERS FOR THE SUMMER MARKET

Experiment II - 1945-46

A. D. Weber and F. W. Bell

Phase I - Wintering. November 29, 1945 to April 18, 1946 - 140 days

1-Lot number	1	2	3	4
2-Number of heifers	10	10	10	10
3- Average daily ration:				
Ground shelled corn	10.06	5.04	2.52	...
Atlas sorgo silage	16.75	25.94	29.65	31.66
Cottonseed meal	1.44	1.44	1.44	1.44
Ground limestone	0.10	0.10	0.10	0.10
4-Average initial weight	514	517	514	516
5-Average final weight	788	738	708	671
6-Average gain	274	221	194	155
7-Average daily gain	1.96	1.58	1.39	1.11
8-Feed cost for 100 pounds gain - wintering phase	$ 14.68	$ 13.29	$ 12.18	$ 11.15
9-Corn consumed per heifer - bushels	25.15	12.59	6.30	...
10-Appraised value per cwt. May 4, 1946				

FEED PRICES: Ground shelled corn, $1.12 per bushel; Silage, $5 per ton; Cottonseed meal, $60 per ton; Ground limestone, $20 per ton.

Observations

This is the second test conducted at the Kansas Agricultural Experiment Station in an attempt to develop a standard system of fattening heifers for the summer market without the use of pasture. Each lot received silage, cottonseed meal and ground limestone during the wintering phase. In addition, ground shelled corn was fed as follows: Lot 1, full feed; Lot 2, one-half feed; Lot 3, one-fourth feed; Lot 4, none.

Full feeding was started in Lots 2, 3 and 4 on April 18, 1946. It is planned to market each lot when an average weight of approximately 850 pounds per heifer is reached. Marketing information and slaughter data will be obtained for each lot.

COMPARISONS OF COTTONSEED MEAL AND MIXTURES CONTAINING UREA AS NITROGENOUS (PROTEIN) SUPPLEMENTS

A. D. Weber

Tests with urea in beef cattle rations have been conducted at the Kansas Agricultural Experiment Station since 1940. In the first test, urea was compared with cottonseed meal as a source of nitrogen for fattening calves. The calves were fed individually for 168 days. Basal feeds fed to each group included ground shelled corn, Atlas sorgo silage, cane molasses and a mineral supplement. Both groups received the same quantities of these feeds. In addition, one group received cottonseed meal as a source of nitrogen. A second group received urea and enough other materials to provide the same quantities of nitrogen, energy and minerals furnished by the cottonseed meal fed to the first group.

During the 168 days that this feeding program was followed there was no difference in the average daily gains and the ration containing urea appeared to be just as palatable as the one containing cottonseed meal.

While being fed individually, part of the steers were used in technical studies to determine digestion coefficients and nitrogen balances. The results obtained during this phase of the investigation indicated that the percentage retention of urea nitrogen was fully equal to the retention of cottonseed meal nitrogen. Furthermore, the nutrients in the rations containing urea were digested as well as the nutrients in the rations which included cottonseed meal as a source of supplemental nitrogen.

For a 136-day period following the digestion trial and balance study, the steers were continued on the test rations, but were fed in two groups. The ground shelled corn was self-fed instead of being hand-fed twice daily. During this period the steers fed cottonseed meal as a source of supplemental nitrogen had somewhat better appetites, made larger gains and required less feed per 100 pounds of gain than did those fed urea as a source of supplemental nitrogen. It would seem, therefore, that when maximum gains are the objective, complete substitution of urea for cottonseed meal should not be made.

Subsequent feeding trials have dealt with the use of urea in wintering rations for stock cattle. Digestion coefficients obtained for wintering rations containing urea were comparable to those for wintering rations supplemented with cottonseed meal. Silage alone and silage plus prairie hay were the roughages used in these studies.

Results of group feeding trials completed during the past two years indicate that stock calves derive considerable benefit from the nitrogen in urea. In no instance, however, where urea was substituted entirely for cottonseed meal as a source of nitrogen were the gains as large as where cottonseed meal was fed. It should be noted in this connection that enough grain and mineral supplement were added to urea to provide the same quantities of energy and minerals furnished by the cottonseed meal fed to the test group.

The use of urea in wintering rations had no influence upon subsequent pasture gains of yearling and two-year-old steers. Pasture gains tended to be inversely proportional to the gains made during the winter irrespective of the kind or quantity of wintering ration used.

The results of the tests conducted to date at the Kansas Agricultural Experiment Station indicate that urea may be used advantageously in beef cattle rations for both fattening and wintering. However, supplementary mixtures in which urea furnished most of the nitrogen were not equal to cottonseed meal. It may be concluded, therefore, that urea should not be depended upon to supply the greater part of the nitrogen in a supplementary mixture used to replace cottonseed meal in a beef cattle ration.

Further tests will have to be made to determine the proportions of grain, urea and protein concentrate that will equal cottonseed meal.

Preliminary reports from the Oklahoma Station indicate favorable results from feeding pellets containing 25 per cent and 50 per cent urea mixed with a vegetable protein, such as cottonseed meal.

TABLE I - GRAIN COMPARISONS FOR FATTENING LAMBS

R. F. Cox and L. M. Sloan

Kansas Agricultural Experiment Station

1-Lot number	1	2	3	4	5	6	7	8	9
2-Ration fed	Corn Protein supple- ment Roughage	Wheat Protein supple- ment Roughage	Milo Protein supple- ment Roughage	Kafir Protein supple- ment Roughage	Atlas Protein supple- ment Roughage	Wheatland Milo Protein supple- ment Roughage	Westland Milo Protein supple- ment Roughage	Sumac * Protein supple- ment Roughage	Leoti X Atlas Protein supple- ment Roughage
3-Averages for number of tests	13	5	58	2 *	15	3	23	3 *	4
4-No. lambs per lot	32	41	46	44	27	40	49	41	50
5-No. days on feed	108	116	109	103	87	107	115	105	145
6-Initial wt. per lamb	63.62	63.56	60.33	61.01	67.60	56.17	67.13	60.29	65.75
7-Final wt. per lamb	98.31	96.80	95.14	94.69	91.27	89.85	99.74	92.00	103.55
8-Total gain per lamb	34.69	33.24	34.81	33.68	23.67	33.68	32.61	31.71	37.80
9-Daily gain per lamb	.32	.29	.32	* .32	.27	.31	.28	* .30	.27
10-Feed per lamb daily									
Grain	1.03	1.14	1.03	1.01	1.08	.89	1.17	1.01	1.09
Supplement	.23	.20	.23	.25	.24	.25	.23	.25	.24
Roughage	1.57	1.93	2.31	2.01	1.94	2.41	1.80	2.17	2.00
11-Feed per cwt. gain									
Grain	321.88	393.10	321.88	*315.63	400.00	287.10	417.86	* 336.67	403.70
Supplement	71.88	68.97	71.88	78.13	88.89	80.65	82.14	83.33	88.89
Roughage	490.63	665.52	721.88	628.13	718.52	777.42	642.86	723.63	740.74

* The gains in these two lots were higher and the feed required 100 pounds of gain lower, in relation to the other lots than could normally be expected, since widely different responses were obtained in a smaller number of tests.

TABLE II - ROUGHAGE COMPARISONS FOR FATTENING LAMBS

R. F. Cox and L. M. Sloan

Kansas Agricultural Experiment Station

1-Lot number	1	2	3	4	5	6	7	8
2-Ration fed	Sorghum grain Protein Supp. Alfalfa (1)	Sorghum grain Protein Supp. Alfalfa (1) Sorghum Rg. (2)	Sorghum grain Protein Supp. Atlas Rg. (1) Gr. Lime-stone	Sorghum grain Protein Supp. Sumac Rg. (1) Gr. Lime-stone	Sorghum grain Protein Supp. Milo Rg. (1) Gr. Lime-stone	Sorghum grain Protein Supp. Leoti X Atlas Rg. (1) Gr. Lime-stone	Sorghum grain Protein Supp. Alfalfa straw (1)	Sorghum grain Protein Supp. Brown Alfalfa (1)
3-Averages for number of tests	8	5	2	15	9	11	3	2
4- No. lambs per lot	48	45	50	44	45	49	48	50
5-No. days on feed	116	102	120	112	115	129	115	165
6-Initial wt. per lamb	60.88	57.04	60.44	62.55	61.49	68.46	57.87	61.43
7-Final wt. per lamb	102.39	94.69	91.78	97.09	92.23	102.44	96.24	111.34
8-Total gain per lamb	41.51	37.65	31.34	34.54	31.74	33.98	38.37	49.91
9-Daily gain per lamb	.36	.37	.26	.31	.28	.26	.33	.30
10-Feed per lamb daily								
Grain	1.03	.91	.93	.94	.99	1.13	1.00	1.10
Supplement	.23	.20	.20	.23	.23	.26	.24	.25
Roughage (1)	1.85	.79	2.23	2.07	2.10	1.98	1.87	2.01
Roughage (2)	---	1.06	---	---	---	---	---	---
Gr. Limestone	---	---	(Oz) .25	(Oz) .25	(Oz) .25	(Oz) .25	---	---
11-Feed per cwt. gain								
Grain	286.11	254.05	357.69	303.23	353.57	434.62	303.03	366.67
Supplement	63.89	54.05	76.92	74.19	82.14	100.00	72.73	83.33
Roughage (1)	513.89	213.51	857.69	667.74	750.00	761.54	566.67	670.00
Roughage (2)	----	286.49	----	----	----	----	----	----

TABLE III - PROPORTION OF CONCENTRATES TO ROUGHAGE IN LAMB FATTENING RATIONS

Rufus F. Cox

Kansas Agricultural Experiment Station

	Average of 7 tests			Average of 2 tests			Average of 4 tests		
1-Lot number	1	2	3	1	2	3	1	2	3
2-Ration fed	Corn Protein Supp. Alfalfa (1) Silage (2)	Corn Protein Supp. Alfalfa (1) Silage (2)	Corn Protein Supp. Alfalfa (1) Silage (2)	Corn Alfalfa (1) (Ground and self-fed)	Corn Alfalfa (1) (Ground and self-fed)	Corn Alfalfa (1) (Ground and self-fed)	Sorghum grain Cotton-seed Ck. Sorghum Rg. (1) Gr. Lime-stone	Sorghum grain Cotton-seed Ck. Sorghum Rg. (1) Gr. Lime-stone	Sorghum grain Cotton-seed Ck. Sorghum Rg. (1) Gr. Lime-stone
3-Proportion: Concentrates to	35% to 65%	45% to 55%	55% to 45%	35% to 65%	45% to 55%	55% to 45%	35% to 65%	45% to 55%	55% to 45%
4-No lambs per lot	28	28	27	19	19	19	60	60	59
5-No. days on feed	129	129	129	94	94	94	100	100	100
6-Initial wt. per lamb	63.67	63.77	63.56	66.39	66.45	66.70	63.28	63.35	63.47
7-Final wt. per lamb	99.42	105.02	101.82	89.68	93.20	91.21	90.26	93.65	94.58
8-Total gain per lamb	35.75	41.25	38.26	23.29	26.75	24.61	26.98	30.30	31.10
9-Daily gain per lamb	.28	.32	.30	.25	.28	.26	.27	.30	.31
10-Feed per lamb daily:									
Grain	.72	.97	1.21	1.01	1.24	1.43	.91	1.20	1.40
Supplement	.25	.25	.25	---	---	---	.20	.20	.20
Roughage (1)	.99	.87	.65	1.84	1.59	1.82	2.17	1.83	1.52
Roughage (2)	2.22	1.92	1.54	---	---	---	---	---	---
11-Feed per cwt. gain:									
Grain	257.14	303.13	403.33	404.00	442.86	550.00	337.04	400.00	451.61
Supplement	89.29	78.13	83.33	---	---	---	74.07	66.67	64.52
Roughage (1)	353.57	271.88	216.67	736.00	567.86	507.69	803.70	610.00	490.32
Roughage (2)	792.86	600.00	513.33	---	---	---	---	---	---
12-Feed cost per cwt GAIN	$8.86	$8.03	$8.74	$6.56	$6.16	$6.87	$6.20	$5.95	$6.13

* The proportion of concentrates to roughage was 50:50 in lot 3 one year, instead of 55:45.

SUMMARY - LAMB FEEDING EXPERIMENTS

R. F. Cox and L. M. Sloan

A number of years of lamb feeding experimental work involving, grain comparisons, roughage comparisons and proportions of concentrates to roughage, conducted at the Kansas Agricultural Experiment Station are reported in detail in Tables I, II and III. Some other phases of experimental work conducted at the Kansas station in recent years are summarized in the following statements:

Acre Value of Different Crops:

1. Results expressed in terms of "pounds of finished lamb" per acre of feed grown in different cropping systems, based on four years average crop yields and on the gains made by 4 lots of lambs in 2 experiments, show the following averages:

Pounds Fat Lamb Produced Per Acre of:

Irrigated Finney Milo	923.8
Irrigated (Westland Milo 2/3 acre) (Sumac 1/3 acre)	596.4
Fallow - Finney Milo	506.7
Fallow - (Westland Milo 2/3 acre) (Sumac 1/3 acre)	290.9

In arriving at these figures, adjustment was made for protein and calcium supplements used in the ration.

Methods of Harvesting, Preparing and Feeding:

1. Self-fed lambs have made consistently larger but more expensive gains than hand-fed lambs.
2. Lambing down irrigated and dry land sorghum crops has given satisfactory gains and finish on lambs in all tests, but the gains have been more expensive than those of lot-fed lambs.
3. Lambing down sorghums has proved to be a wasteful and expensive method of feeding in Kansas. Such a practice would be justified in case of very low grain yields or extremely low grain prices.
4. Deferring grain feeding for 30 days at the beginning of the feeding period has resulted in little or no decrease in total gain or finish but has saved grain and thereby lowered the cost of feeding.
5. Relatively more roughage and less grain are utilized in fattening lambs by the deferred grain feeding system, than by full feeding.
6. Comparative tests with heavy medium and light weight lambs reveal no significant differences in the response of the different weight

grades to deferred and full grain feeding.

7. Deferred grain feeding has proved to be a safer method of getting lambs on feed and lower death losses have resulted than with lambs receiving a full grain feed from the start.

8. Heavy lambs have gained faster, but light lambs made cheaper gains consistently in several experiments.

9. Light lambs fed for longer periods profitably utilize relatively more roughage and less grain than heavy lambs fed for short periods.

10. Ground sorghum roughage is more palatable and produced larger gains than the same kind of roughage chopped.

11. Grinding sorghum grain for fattening lambs does not pay. Whole grain is chewed thoroughly and apparently utilized more efficiently.

12. Thrashing sorghum grain for lambs is unnecessary provided the heads are ground, chopped or otherwise reduced to prevent excessive waste.

13. Grinding sorghum roughage does not improve its nutritional value but greatly increases the efficiency of its utilization through increasing the percentage of the plant consumed, thereby reducing waste.

14. There was no advantage in increasing the concentration of lamb fattening rations periodically as the feeding period progressed, over feeding a ration constant in concentration and bulkiness throughout.

15. Lambs running in a combined Milo stalk field either with or without a grain feed, for 30 days, before going into the feedlot, made approximately the same gains at a decidedly lower rate than those fed the same ration in the feedlot.

Sugar Beet By-Products:

1. Replacing 1/4 the Milo grain in the ration with beet molasses resulted in a slight increase in gain, but when 1/2 the grain was so replaced the gain was somewhat reduced.

2. Dried beet pulp and Milo grain equal parts produced larger gains than Milo grain alone or Milo grain and molasses.

3. When dried beet pulp and molasses are approximately the same price per pound as grain, either can be used as a part of the concentrate ration for lambs with a resulting saving in feed costs.

4. Beet tops fed as a part of the roughage increased the gains and reduced the cost of gains on lambs providing dry roughage was also fed.

Wheat Pasture Tests:

1. Repeated tests show little advantage for feeding grain, roughage, protein supplement or ground limestone to lambs on wheat pasture, unless digestive trouble is being experienced.

2. Dry roughage helps to prevent digestive disorders among lambs on wheat pasture.

3. Lambs given access to a Milo stalk field (combined) while on wheat pasture gained more than those receiving wheat pasture alone.

4. Lambs were grazed on wheat which had 125 lbs. per acre of treble superphosphate per acre applied at the time of sowing. A very slight increase in gain accompanied the grazing of the fertilized wheat. In this case, however, the soil was not deficient in phosphorus in the first place.

5. The blood of the lambs grazed on phosphated wheat pasture was nearly 20% higher in phosphorus but virtually no different in calcium and potassium content from the blood of lambs grazing unfertilized wheat.

POINTERS ON HOW TO PRODUCE A TRUE-BREEDING HERD OF POLLED HEREFORDS OR SHORTHORNS

Heman L. Ibsen

It is a well-known fact that Aberdeen-Angus cattle breed true for the polled characteristic. By that I mean that they never produce a calf with horns. Sometimes a purebred Angus bull will have scurs, but from a genetic standpoint he is still considered a polled animal. Scurs are objectionable and could be bred out of the Angus breed if no scurred bulls were ever used for breeding purposes. Removing the scurs with caustic does not change a bull's breeding qualities.

Since the Aberdeen-Angus cattle breed true for polled, one might get the idea that it would be easy to produce a true-breeding strain of polled Herefords or Shorthorns. Such is not the case, however. The method used in learning more about the inheritance of the polled characteristic is to cross true-breeding polled animals, like the Angus, with horned cattle. If the inheritance were simple, all of the offspring from such a cross would be clean-polled, but they are not. A clean-polled Angus bull mated to horned cows will have daughters all of which are clean-polled, but amongst the sons there may be a few that have horns, and also a few that have scurs. Most of the sons, however, will be clean-polled. The sons with scurs or horns inherit these characteristics from their horned dams. Only a few horned dams produce sons of the above type, but there is no method known at present whereby they can be distinguished by their appearance from the horned dams that have only clean-polled sons in matings with clean-polled Angus bulls.

Before going any further, it may be worth while at this point to describe what would happen if a clean-polled bull that does <u>not</u> breed true for polled were mated to horned cows. Instead of all of his daughters being clean-polled, only one-half of them will be, and the other half will be horned. Less than one-half of his sons will be clean-polled, and more than one-half of the sons will be either horned or scurred. Many of the clean-polled bulls at present in polled Hereford or Shorthorn herds are of the kind that do not breed true, and would breed like the bull described above when mated to horned cows.

One criticism made of present day polled Herefords or Shorthorns is that they are inferior from the standpoint of conformation to the horned animals of these breeds. There is no reason whatever for assuming that the polled animals are inferior because they are polled. Being polled does not seem to have any bad effect on the conformation of the Aberdeen-Angus breed.

With the preceding statements as a background, I shall try to show the various steps that should be taken by a breeder having a herd of horned cattle, and who is interested in converting his herd into one breeding true for polled. The first step is to use a clean-polled bull of his breed on his cows. If the cows in the herd have good conformation there is a possibility that some of the polled daughters will be fairly good animals even if the polled bull is somewhat deficient. If the clean-polled bull used is not of the true-breeding kind, one would nevertheless expect at least one-half of the daughters to be clean-polled.

If the polled daughters are not satisfactory from the standpoint of conformation and size, the next step is to mate them to a good horned bull in order to improve the conformation. Here again, half of the daughters will be polled and should have a better conformation than their dams.

When the conformation is satisfactory, the next step is to attempt to produce a true-breeding polled herd. If a polled animal has one parent that is polled and the other is horned, there is no possibility that such an animal will breed true for polled. When both parents are polled there is a possibility of at least some of the polled offspring breeding true.

We will suppose that the breeder has been crossing his polled cows to good horned bulls and has finally succeeded in producing polled animals of good conformation. All of these polled animals, whether males or females, will be of the non-true-breeding kind. If he is not afraid of inbreeding he can mate his best polled bull to the polled cows. If he does not wish to inbreed, he can use a bull produced by some other breeder who has used breeding methods similar to those used by himself.

When a non-true-breeding polled bull is mated to polled cows that are also of the non-true-breeding kind, one-fourth, at least, of the offspring will be horned or scurred. The remainder will be polled. Of these, one-third will be of the true-breeding kind, and two-thirds of the non-true-breeding kind. There is no way of distinguishing these two kinds of polled animals by their appearance.

The next step is for the breeder to secure a true-breeding polled bull to use on the two kinds of polled cows. There is no way of knowing whether you have a bull of this type unless you test him by mating him to horned cows. Only one out of every three of the polled bulls obtained in the mating described in the previous paragraph will be true-breeding. Therefore a number of bulls should be tested by mating them to horned cows. As soon as one of these bulls sires a horned daughter it means that he is of the non-true-breeding kind, and he should not be retained in the herd. He would, however, probably be very acceptable to another breeder who had not started as yet to make his herd true-breeding. As the tests continued, one or more of the polled bulls would prove to be true-breeding by the fact that they each produced 10 or more daughters, all of whom were clean polled. As stated previously, a true-breeding polled bull might have one or more horned sons when mated to horned cows, but this can be disregarded.

It was also stated previously that, when both polled parents are of the non-true-breeding kind, one-third of the polled offspring are true-breeding kind, and the remaining two-thirds are non-true-breeding. Cows made up of these two kinds are now mated to the clean-polled bull that has been tested and shown to be true-breeding. In a mating of this sort there will be a great increase in the number of true-breeding polled offspring. Instead of one-third, there will now be two-thirds that are true-breeding and only one-third that does not breed true.

When a second tested true-breeding bull is used on the offspring of the first tested bull, 5 out of 6 will be true breeding and only 1 out of 6 will be non-true-breeding. When a third tested true-breeding polled bull is used on the daughters of the second bull, 11 out of 12 of the offspring, whether male or female, will be true-breeding and only 1 out of 12 will be non-true-breeding. With the fourth tested bull it will be $\frac{47}{48}$ of the offspring that will be true breeding and only $\frac{1}{48}$ that will be non-true-breeding. At this point one would expect that practically any bull in the herd when tested would prove to be true-breeding.

If the breeder should get this far, and then get careless, using a non-breeding polled bull on his herd, only one-half of the offspring will be true-breeding for polled and the other half will be polled animals that do not breed true.

There are several other pointers that should be kept in mind. Occasionally it will be found that when a true-breeding clean-polled bull is mated to clean-polled cows he may have a son that is horned. This is due to the fact that a polled cow may carry the determiner for horns and not show them herself, but her son will be horned if he gets this determiner from his dam. Similarly, a clean-polled cow may carry this determiner for scurs, but, if she passes on this determiner to her son, he will have scurs. The reason for not using a sire with scurs is that if he is mated to true-breeding clean-polled cows, at least one-half of his sons will have scurs, and possibly a few of his daughters.

One other point. If a clean-polled bull has been tested and is thought to be true-breeding, he should never have a horned daughter when he is mated to polled cows. If a polled bull does have a horned daughter, it is a sure sign that he is of the non-true-breeding kind.

RESULTS OF SWINE FEEDING INVESTIGATIONS

1945 - 1946

C. E. Aubel

EXPERIMENT I - PRODUCING MARKET PIGS WITH A MINIMUM OF GRAIN AND A MAXIMUM OF PASTURE

In order to produce swine profitably, it is necessary to make use of forage crops. This practice will not only save grain, but will contribute to the general health of the swine themselves. Since the country has been at war, grain has not always been available. As a result, hog feeders are interested in methods of fattening that will utilize the maximum amount of pasture, so that grain can be saved.

Consequently, a limited feeding test was conducted to study this problem. Two lots of 20 pigs each were used in this test. The initial weight of the pigs was 68 pounds on June 12. One lot was self-fed shelled corn on alfalfa pasture until October 3, a period of 113 days, by which time each pig had gained 176 pounds. They received with the corn each day 0.2 pounds tankage per head. To compare with this lot, another group of 20 pigs, with the same initial weight, were put on feed the same day and hand-fed daily 1 pound of corn and 0.2 pounds of tankage per pig on good alfalfa pasture. This feeding period was 113 days, and the pigs weighed 148 pounds. At this time they were allowed to run to self-feeders for finishing. They received an unlimited supply of corn, but the protein supply was retained at 0.2 pounds daily. This finishing period necessitated 34 days, when they were ready for market and weighed 239 pounds, about the same as those in Lot 1 when they were marketed.

EXPERIMENT I - OBSERVATIONS

From the data following, it is shown that by limiting the amount of corn and tankage to fattening pigs on alfalfa pasture, it required 34 more days to finish them to the same weight as the full-fed grain pigs, but the amount of grain required per 100 pounds gain for their entire feeding period was much less. Thus, the limited fed pigs produced their gains at a cost of $5.14 a hundred pounds while the pigs allowed free access to corn made their gains at a cost of $7.33 a hundred pounds. This is a saving of $2.19 a hundred. The saving of grain was 116.5 pounds of corn for every hundred pounds of gain.

Another interesting point is the satisfactory gains made by the pigs on the reduced protein allowance. The pigs receiving a full feed of corn and only one-fourth pound of tankage per head daily gained 1.46 pounds a day. Limiting the tankage forced the pigs to get much of their protein from the alfalfa pasture which saved protein, and consequently reduced the cost of gains.

A summary of their feeding record follows:

EXPERIMENT I - SUMMER, 1945

FULL FEEDING VS. GROWING THEN FULL FEEDING SPRING PIGS ON ALFALFA PASTURE

C. E. Aubel

(June 12, 1945 to November 6, 1945 - 147 days)

Ration	Alfalfa Pasture		
	Shelled corn (self-fed) Tankage (hand-fed) 0.2 lb. per pig daily	Shelled corn (hand-fed) 1 lb. per pig daily 0.2 lb. per pig daily	Shelled corn (self-fed) Tankage (hand-fed) 0.2 lb. per pig daily
Lot number	1	2	2
No. pigs per lot	20	20	20
Dates of test (1945)	June 12 to Oct. 3 (113 days)	June 12 to Oct. 3 (113 days)	Oct. 3 to Nov. 6 (34 days)
	Growing Period		Finishing Period
	Pounds	Pounds	Pounds
Av. initial wt. per pig	68.86	67.66	148.50
Av. final wt. per pig	234.16	148.50	239.23
Av. total gain per pig	165.30	80.84	90.74
Total gain Lot 2 (147 days)		171.58	(Av. da. gain 1.16 for 147 days)
Av. daily gain per pig	1.46	.71	2.66
Av. daily ration per pig:			
Shelled corn	5.01	1.00	8.05
Tankage	.20	.20	.20
Feed consumed per 100 pounds gain:			
Shelled corn	342.95	139.78	296.13
Tankage	13.67	27.95	9.69
Feed consumed per 100 pounds gain Lot 2 for entire period (147 days)			
Shelled corn		225.40	
Tankage		18.30	
Feed cost per 100 pounds gain	$7.33	$5.14	

FEED PRICES CHARGED: Shelled corn, $1.12 per bushel - Tankage $70 per ton.

EXPERIMENT II - WINTER, 1946

LIMITING THE PROTEIN SUPPLEMENT IN THE FINAL STAGES OF FATTENING FALL PIGS FED IN DRY LOT

C. E. Aubel

The Protein Supplement used in Lots 2 and 3 was composed of Tankage, 2 parts; Meat scraps, 2 parts; Soybean Oil Meal, 4 parts; Alfalfa Leaf Meal, 1 part; and Cottonseed Meal, 1 part.

(February 14, 1946 to April 4, 1946 - 59 Days)

Ration	Shelled Corn (Self-fed)	Shelled Corn (Self-fed) Protein Supplement (Self-fed)	Shelled Corn (Self-fed) Mixed Protein Supplement .2 Lb. Per Head Daily (Hand-fed)
Lot No.	1	2	3
Number pigs in lot	10	10	10
Av. initial weight per pig	Pounds 154.86	Pounds 158.60	Pounds 160.33
Av. final weight per pig	228.60	256.63	252.16
Av. total gain per pig	73.76	98.03	91.83
Av. daily gain per pig	1.25	1.66	1.53
Av. daily ration per pig Shelled corn Protein supplement	 6.55	 7.48 .44	 6.76 .20
Feed consumed per 100 pounds gain: Shelled corn Protein supplement	 524.53	 450.78 28.05	 434.71 12.84
Feed cost per 100 pounds gain	$10.49	$ 9.87	$ 9.09

Feed Prices: Shelled Corn, $1.12 per bushel.
Protein Supplement, $3.10 per hundred.

Method of Feeding: All lots were self-fed shelled corn. Lot 1 received no protein supplement. Lot 2 was self-fed a mixed protein supplement. Lot 3 was hand-fed daily the same mixed protein supplement as Lot 2 at the rate of 0.2 lb. per head.

OBSERVATIONS AND CONCLUSIONS

1. The most economical gains were made by the limited protein fed pigs, $9.09 per 100 pounds gain. The next most economical ones were those self-fed the protein supplement, which cost $9.87 per 100 pounds gain. The highest cost gains were the corn alone fed ones, which cost $10.49 per 100 pounds gain.

2. The most rapid gains were made by the pigs self-fed protein and corn. They gained 1.66 pounds per day. The limited protein fed pigs gained at the rate of 1.53 pounds daily, while the pigs fed corn alone made the slowest gains, only 1.25 pounds daily.

3. The most efficient ration was that of the limited fed pigs. They required only 434.7 pounds corn per 100 pounds gain with but 12.8 pounds of supplement. The pigs fed corn alone required 524.5 pounds of corn per 100 pounds gain, which resulted in rather costly gains.

4. The pigs in Lot 1 fed corn alone were not nearly as well finished as those receiving the protein supplement. They also lacked about 24 pounds of being as heavy.

5. This demonstrates that a protein supplement is necessary to balance the corn fed to 150-pound pigs being finished for market. In this test 0.2 pounds of a mixed supplement per head per day gave the best results and most economical gains.