A METHOD OF ESTIMATING THE FEEDING VALUE OF SWINE PASTURES

by

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Thesis Submitted to the Graduate Faculty of the
Virginia Polytechnic Institute
in candidacy for the degree of

MASTER OF SCIENCE
in
ANIMAL HUSBANDRY

APPROVED:

Director of Graduate Studies

Head of Department

Dean of Agriculture

Supervisor or Major Professor

1954

Blacksburg, Virginia

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INTRODUCTION

For many years, pastures in Eastern Virginia were of very small acreage. On most general farms, a pasture was a small plot of land usually seeded with native grasses and used almost entirely for summer grazing of the home cow. It was believed, generally, that swine would not graze and, therefore, pastures were not seeded for them. It became evident to farmers in this locality that swine would graze cover crops and that they were especially fond of crimson clover. Futhermore, it was noticed that in most cases swine preferred a legume to grass crops.

Surveys[1] made semi-annually by the Virginia Department of Agriculture, Richmond, Virginia, indicate that a vast majority of the swine industry in this state is located in the peanut belt which includes Southampton, Nansemond, Sussex, Surry, Isle of Wight, Norfolk and Greenville counties. It was generally agreed that if a swine research program was to be initiated, it should be conducted in the area where the highest concentration of hogs were located. Thus, the Tidewater Field Station, Holland, Virginia, a sub-station of the Virginia Agricultural Experiment Station, was selected as the site for swine research.

[1]Surveys published semi-annually by the Division of Agricultural Statistics in cooperation with the United States Agricultural Marketing Service.

With the initiation of swine research at the Tidewater Field Station, Holland, Virginia, on July 1, 1948, it was decided that a series of experiments would be conducted to determine a suitable pasture for swine and to study their grazing habits and feed consumption while on these pastures. Animals in the pasture lots were to be compared with similar animals fed in dry lots. County agents, vocational teachers and farmers were impressed when they saw the condition of the animals on pasture, even though they were being fed a limited amount of concentrates. A program calling for the seeding of swine pastures was initiated but almost immediately another question was asked. What is the feeding value of pastures for swine? Methods of estimating the feeding value of swine pastures were unsatisfactory with the earlier experiments, and in 1951 the feed replaced by the pastures was not estimated because data collected for the test were insufficient for accurate estimations.

In 1952 a new technique was initiated with the hopes that it could be more useful in estimating the feeding value of swine pastures. It was felt that this method, if satisfactory with swine, might have a wide application and be useful also to estimate the feeding value of pastures for sheep, beef cattle and other classes of livestock.

REVIEW OF LITERATURE

A thorough search through the literature revealed that most research on pastures was designed to make comparison of different kinds of pasture crops for swine rather than to estimate the value of pasture as a means of replacing concentrates.

Smith (1937) reported the result of experiments conducted by Kennedy and Evvard (1913) to determine the relative value of certain kinds of pastures for swine. In these tests average daily gain and feed consumption per 100 pounds of gain were used to measure the feeding value of the pasture.

Anderson (1945) reported the results of several experiments conducted at Iowa State College, Ames, Iowa. The experiments were designed to compare average daily gain and feed required per 100 pounds of gain of pigs self-fed in dry lot and on pasture. Average daily gain of pigs on alfalfa, rape and in dry lots was 1.31, 1.30 and 1.05 pounds respectively. Feed required per 100 pounds of gain on alfalfa, rape and in dry lot was 374, 375 and 441 pounds of corn and 21, 23 and 42 pounds of tankage respectively. Net returns over cost of corn and tankage were $92.39, $93.05 and $29.72 per acre for alfalfa, rape and dry lot respectively. The returns from the pasture-fed groups were greater than that of dry lot fed groups, exclusive of higher selling price due to their being ready for an early fall market or the value of the manure distributed on the land.

Weaver (1947) compared sweet clover, alfalfa and rape as pasture

crops for growing and fattening pigs. In order to determine the amount of pork which an acre of each crop would produce, it was necessary to substract from the total gain that which might be expected from the dry lot feeding of any grain fed in addition to the pasture. To obtain this information, a pound of pork was accredited for each 5.6 pounds of grain. Monetary values of the pasture were computed, based on current prices of pork.

Blaser, et. al., (1952) in discussing methods of determining pasture yields, concluded that results may be expressed as animal days per acre, gain per acre, milk production per acre, total digestible nutrients per acre or clippings can be made and weights obtained of the forage removed from the pasture.

Carroll and Krider (1950) summarized the results of ten experiments in which pigs on alfalfa, bromegrass and a mixture of barley or oats and rape were compared with pigs fed in dry lot. Average daily gains were similar, but pigs fed in dry lot required insignificantly less grain than those fed on pasture and nearly 50 per cent more supplement per 100 pounds of gain. Direct comparisons of pigs on pasture and in dry lot were made, since animals were similar in weight and differences in average daily gains were insignificant. It was estimated that the pastures replaced 663 pounds of supplement per acre.

Most investigations have been designed to determine the value of different kind of pastures with pigs of similar initial weights. Direct comparisons, based on feed consumption, between pigs fed in dry lot and pigs fed in pasture were not included in the design of the experiments reviewed.

INVESTIGATIONS

1949 Investigations

Procedure - 1949

Swine pasture studies were initiated in the Spring of 1949. The objectives of these studies were: (1) to compare ladino clover with a combination of crimson clover and lespedeza as a pasture for swine, (2) to study the effects of grain and protein supplement on rate of gain, and (3) to estimate the feeding value of these pastures.

Pasture lots were seeded in pairs with each kind of pasture appearing four times in the test. These pastures were seeded alternately (lespedeza, ladino, lespedeza, ladino, etc.). Randomizing might have been better. Experimental animals were raised on the station. In the event the number of animals raised at the station was insufficient, additional pigs were purchased to insure an adequate number of animals for each kind of pasture. Feeding treatments were at a high and low level of grain, with and without a protein supplement. For purposes of comparison, groups of pigs were fed in a similar manner in dry lots at the high and low levels with supplement.

Pigs in dry lot fed at the low level with yellow shelled corn and 38% protein supplement, the protein supplement making up 18% of the ration, were compared with pigs on pasture fed at the low level. This group of pigs was fed at a rate which would enable them to make gains comparable to those gains made by pigs fed at the low level on pasture. All pigs were weighed at two week intervals. The total

feed fed each lot was based upon the body weights of the pigs, as recorded each weigh day.

To eliminate the possibility of a mineral deficiency, animals in each lot were provided an adequate mineral mixture mixed with the supplement or in case the animals were being fed without supplement, they were supplied a mineral mixture in self-feeders.

In February, 1949, eight lots, one acre in size, were seeded. Four lots were seeded with ladino clover and four lots were seeded with Columbia oats followed by Korean lespedeza. Early grazing was contemplated from the pastures seeded with oats, however, the pigs raised for this test were weaned late and due to this delay, the oats headed out and were hogged-off during the test. A very poor stand of lespedeza was obtained for this study. It was thought that this was due in part to a heavy growth of volunteer Italian rye grass which came up in all of the lots and shaded the lespedeza out. Two dry lot groups of pigs were fed in conjunction with this test. These groups of pigs were made up of animals which were positive reactors to the Brucellosis test.

Due to the small number of pigs raised at the station, it was necessary that 53 pigs be purchased for this test. All lots received an equal number of purchased pigs and pigs raised at the station, dry lots excluded. Pigs raised at the station were selected for individual lots at random by litters.

Pigs on the two kinds of pastures and in the dry lots were fed at

two grain levels with and without protein supplement. Two lespedeza lots were fed at the high level (4% of the body weight) and two lespedeza lots were fed at the low level (2% of the body weight). One of the high level fed groups was fed yellow shelled corn without a protein supplement, while the other high fed group was fed yellow shelled corn with 18% of the total ration being a 38% complete protein supplement. The high level fed groups of pigs on ladino clover were fed in a manner similar to that of the high level fed groups of pigs on lespedeza. One dry lot group of pigs was self-fed with yellow shelled corn and 38% protein supplement. This lot was compared with the high level fed groups of pigs on both kinds of pastures.

Pigs on two lespedeza lots were fed at the low level. One of these lots was fed yellow shelled corn without supplement while the other group of pigs was fed yellow shelled corn with 18% of the ration being a 38% protein supplement. The low level fed groups of pigs on ladino clover were fed in a manner similar to that of the low level fed groups of pigs on lespedeza. A dry lot group of pigs was fed at low level for comparison with the low level fed pigs on both kinds of pastures. (See Tables 1 and 2).

Table 1

Feeding Treatments (1949)

Treatment Number	Method Fed	Rate of Feeding	Percentage of Ingredients in Feed Mixture
1	Hand-fed	4% body weight	95% ground corn 5% special mineral mixture
2	Hand-fed	4% body weight	18% complete hog feed
3	Hand-fed	2% body weight	95% ground corn 5% special mineral mixture
4	Hand-fed	2% body weight	18% complete hog feed
5	Self-fed	Free choice	Yellow shelled corn 38% protein supplement

Table 2

Feed Treatments For Individual Lots (1949)

Lot Number	Treatment Number	Kind of Pasture
1	2	Lespedeza
2	2	Ladino
3	1	Lespedeza
4	1	Ladino
5	3	Lespedeza
6	3	Ladino
7	4	Lespedeza
8	4	Ladino
9	4	Dry Lot
10	5	Dry Lot

Results - 1949

This test was commenced on June 7, and concluded August 28, 1949. Rainfall during the early summer months was sufficient to encourage rapid pasture growth. In this period of lush growth, the number of pigs per acre of pasture could have been increased but they were not available. During the month of August, 1949, rainfall was below normal and it was observed that the ladino clover was being grazed off faster than it was being replaced by new growth. Lespedeza pastures withstood the heat and dry weather but grazing was curtailed, since the plant was reaching maturity and had become rather woody and less palatable. These tests were concluded in order that the stand of ladino clover would be preserved for future studies and because the lespedeza had terminated its ability to be useful as a pasture for swine.

Data from these test were analyzed by analysis of variance and comparisons among pasture treatments were made within litters and also within groups of pigs purchased at the same time from the same source. Observations were:

1. The addition of a high quality protein supplement to the ration of pigs on ladino pasture, fed at either the high or low level of nutrition, failed to increase the average daily gains of the animals.

2. The feeding of a high quality protein supplement to pigs on lespedeza, significantly increased the average daily gain of pigs fed at the high level of nutrition but failed to significantly increase average daily gain of the animals fed at the low level of nutrition.

3. Comparison of average daily gain of high level fed pigs and low level fed pigs on the two pastures combined resulted in highly significant average daily gain in favor of the high level of feeding.

4. When comparisons were made among high level fed pigs on pasture and self-fed pigs in dry lots, significantly higher average daily gains were made by the pigs self-fed in dry lot.

5. Comparisons of average daily gain among low level fed pigs on ladino clover and low level fed pigs in dry lot resulted in significantly higher average daily gain in favor of the pasture pigs.

6. The average daily gain of low level fed pigs on lespedeza pasture was approximately the same as those fed at the low level in dry lots.

7. At the high level of nutrition, lespedeza compared favorably with ladino, if a high quality protein supplement was included in the ration.

8. At the high level of nutrition the addition of a protein supplement to the ration significantly increased the average daily gain of pigs on lespedeza pasture.

9. An estimation of the feeding value of the two kinds of pastures was determined by computing the regression of feed consumption on average daily gain of the two groups of dry lot fed pigs. Using the data from the two dry lot fed groups of pigs as a basis, the expected feed consumption of similar fed pigs on the two kinds of pastures was calculated. The difference between the actual and expected feed consumption of similar fed pigs on the two kinds of pastures was calculated.

The difference between the actual and expected feed consumption was assumed to be the feeding value of the pasture per pig day. The feeding value of the pasture multiplied by the number of pig days per acre gave an estimate of the feed equivalent value of the pasture per acre. Figure 1 illustrates the method used to estimate the expected feed consumption for a given average daily gain.

A summary of these data is shown in Table 3 and observations were as follows:

A. Pastures in this study were more valuable to pigs fed at the low level of nutrition than those fed at the high level of nutrition.

B. At the low level of nutrition, ladino clover was a more valuable pasture for pigs than lespedeza. This might have been the result of a poor stand of lespedeza.

C. The value of pasture for pigs fed at the high level of nutrition was small and in some instances a negative value was obtained. This could be a result of the pasture pigs exercising more than the dry lot pigs with which they were compared, since the pasture lots were much larger than the dry lots.

Table 3

Value of Pasture When Supplemented with Different Feed at the High and Low Level of Nutrition-1949

Pasture Lots	Feed Treatment	Daily Gain (lbs.)	Daily Feed Consumption		Pig Days Per Acre	Pasture Equivalent	
			Actual (lbs.)	Expected (lbs.)		Per Pig Day (lbs.)	Per Acre (lbs.)
Ladino	S. C. P.*	.66	2.23	2.22	995	-.01	-10
Ladino	S. C.	.70	2.07	2.32	995	.25	249
Ladino	L. C. P.	.38	.80	1.58	979	.78	764
Ladino	L. C.	.45	.83	1.69	995	.86	856
Lespedeza	S. C. P.	.58	2.01	2.01	982	.00	00
Lespedeza	S. C.	.37	1.54	1.48	967	-.06	-58
Lespedeza	L. C. P.	.33	.74	1.37	973	.65	632
Lespedeza	L. C.	.28	.72	1.22	995	.50	495

*S.C.P. = Fed at high level with corn and supplement
S. C. = Fed at high level with corn
L.C.P. = Fed at low level with corn and supplement
L. C. = Fed at low level with corn

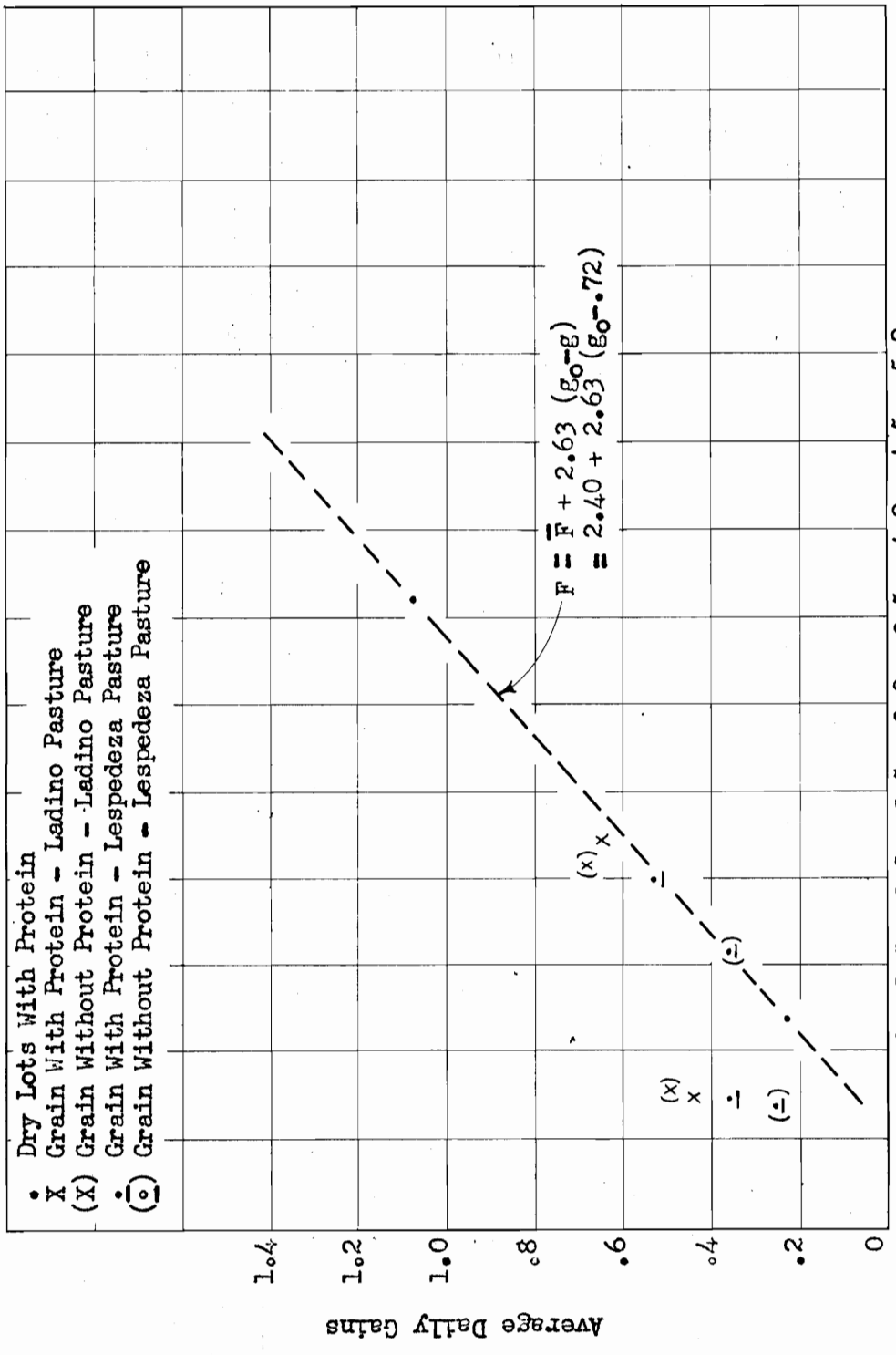

FIGURE 1 REGRESSION OF AVERAGE DAILY FEED CONSUMPTION ON AVERAGE DAILY GAIN - 1949

1950 Investigations

Procedure - 1950

The study in 1950 was similar to the one conducted in 1949 with a few changes. The same lots were used, however, in the Fall of 1949 reseeding crimson clover was seeded to the lespedeza lots instead of oats. Lespedeza was seeded in the crimson clover in the Spring of 1950. As was the case in 1949, a poor stand of lespedeza was obtained. Again it appeared that the heavy growth of crimson clover and volunteer rye grass crowded out the lespedeza. The original stand of ladino clover had been maintained, therefore, additional seeding was unnecessary.

A few changes were made with regard to the methods of feeding. All groups of animals fed at the high level were self-fed, while the groups of animals fed at the low levels were fed at the rate of one pound per pig daily.

Feeding treatments used in this study are shown in Table 4 and feeding treatments for individual lots are shown in Table 5. Two dry lot groups of pigs were fed at the high level with treatment 1. Two dry lot groups of pigs were fed at the low level with feeding treatment 3. One of the dry lot groups fed at the high level and one of the dry lot groups fed at the low level were carried as comparisons for the similarily fed pigs on lespedeza pastures. Likewise, one dry lot group of pigs fed at the high level and one dry lot group of pigs fed at the low level were carried as a comparison for similar fed pigs on ladino clover pastures.

For purposes of statistical analyses, litters approximately the same age, with the same breeding, in so far as possible, and containing a minimum of six pigs of approximately the same weight were used. Litters meeting these requirements were paired and randomized to either the lespedeza or the ladino clover pastures. After the pasture treatment was determined, the six pigs within a litter were assigned to the four pasture lots and the two dry lots at random, one pig from the litter being assigned to each lot.

Due to the poor stand of lespedeza obtained, it was decided that the number of pigs put in these lots be limited to 11. Tremendous growth was obtained in the ladino clover pastures and in order that this pasture might be utilized to its fullest extent, surplus pigs were added to these lots. The pig population per lot was increased until each ladino clover lot was carrying 30 pigs.

On August 11, 1950, the rations used in this test were changed as shown in Table 6.

Extremely hot weather and a scant rainfall prevented the pastures from growing as rapidly as they were being grazed. On August 29, 1950, the test was concluded in order that the pasture stands might be maintained for studies to be made in 1951.

Table 4

Feeding Treatments (May 8, 1950 to August 11, 1950)

Treatment Number	Method Fed	Rate of Feeding	Percentage of Ingredients in Feed Mixture
1	Self-fed	Free choice	47.5% ground corn 57.5% supplement 5% special mineral mixture
2	Self-fed	Free choice	95% ground corn 5% special mineral mixture
3	Hand-fed	1 lb./pig daily	47.5% ground corn 47.5% supplement 5% special mineral mixture
4	Hand-fed	1 lb./pig daily	95% ground corn 5% special mineral mixture

Table 5

Feed Treatments for Individual Pasture Lots (1950)

Lot Number	Treatment Number	Kind of Pasture
1	1	Lespedeza
2	1	Ladino
3	4	Lespedeza
4	4	Ladino
5	3	Lespedeza
6	2	Ladino
7	2	Lespedeza
8	3	Ladino
9	1	Dry Lot
10	3	Dry Lot
11	1	Dry Lot
12	3	Dry Lot

Table 6

Feeding Treatments (August 11, 1950 to End of Test)

Treatment Number	Method Fed	Rate of Feeding	Percentage of Ingredients in Feed Mixture
1	Self-fed	Free choice	75% ground corn 25% supplement
2	Self-fed	Free choice	98.5% ground corn 1.5% special mineral mixture
3	Hand-fed	1 lb./pig daily	50% supplement 50% ground corn
4	Hand-fed	1 lb./pig daily	95% ground corn 5% special mineral mixture

Results - 1950

This test was commenced on May 9, 1950. Grazing in the early summer months was abundant in ladino pastures and the number of pigs per pasture lot was increased as pigs became available, until each ladino pasture lot contained 30 pigs. Since forage in the lespedeza pasture lots was scant, a maximum of 11 pigs were put in these lots. During the month of August, 1950, it was observed that the ladino pastures were being grazed off faster than they were being replaced by new growth and the lespedeza was rapidly maturing. Grazing of lespedeza was at a minimum during the later part of August 1950, because the plants were becoming woody and beginning to die. On August 29, 1950, the tests were concluded.

Data from these tests were analyzed by analysis of variance of average daily gain of litter mates on pasture and in dry lot. Observations were:

1. A very poor stand of lespedeza was obtained for this study.

2. The addition of a protein supplement to the ration for pigs on ladino pasture failed to significantly increase the average daily gain of the pigs fed at the high or the low level of nutrition.

3. The addition of a protein supplement to the ration for pigs on lespedeza increased the average daily gain of the pigs fed at the high level of nutrition .56 pounds and was highly significant. Protein supplement failed to increase the average daily gain of pigs fed at the low level of nutrition on lespedeza pasture.

4. Comparison of high level and low level of nutrition on ladino pasture produced a difference of .40 of a pound average daily gain in favor of high level feeding. This difference was highly significant.

5. At the high level of nutrition, pigs fed in dry lot made slightly higher average daily gain than pigs on ladino pasture but the difference was not significant.

6. At the low level of nutrition, pigs on ladino pasture made highly significantly greater gains than pigs fed in dry lot or on lespedeza pasture.

7. Lespedeza compared favorably with ladino as a swine pasture if the ration was fed at the high level of nutrition and included a protein supplement.

8. An estimation of the feed replacement value of the two kinds of pastures was obtained by computing the regression of feed consumption on average daily gain of the two groups of dry lot fed pigs. Using the data from the two dry lot fed groups of pigs as a basis, the expected feed consumption of similar fed pigs on pasture was calculated. The regression equation was:

$$E_{(F)} = \bar{F} + 3.23\ (g - \bar{g})$$

Where:

E(F) = expected feed consumption

F = observed average daily feed consumption

g = gain actually attained by the pig

$\bar{g}$ = average gain

The results of these estimates are shown in Table 7.

9. Observations were:

a. Lespedeza does not appear to be a very valuable pasture crop for swine. The estimated feed replacement value of lespedeza on an acre basis ranged from a positive value of 155 pounds to a negative value of 501 pounds for pigs fed at the high level of nutrition with and without a protein supplement respectively.

b. Ladino clover was observed to be an excellent pasture crop for pigs. The method of feeding influenced the amount of grazing by the pigs, with the heaviest grazing occurring in the pasture lots where the animals were fed at the low level of nutrition. The data indicates that at the high level of nutrition the failure to include a protein supplement in the ration increased grazing by the animals, therefore, reducing consumption of grain.

c. The feed replacement value of ladino pasture was higher when animals were fed at the low level of nutrition than when fed at the high level of nutrition. The average feed replacement value of the pasture was 1289 and 1826 pounds for pigs fed at the high and low level of nutrition respectively. In this test, the feed replacement value of the

pasture where pigs were fed at the high level of nutrition without supplement was slightly less than the average feed replacement value where pigs were fed at the low level of nutrition. These replacement values were 1660 and 1826 pounds, respectively.

Table 7

Value of Pasture When Supplemented with Different Feed at the High and Low Level of Nutrition-1950

Pasture Lots	Feed Treatment	Daily Gain (lbs.)	Daily Feed Consumption		Pig Days Per Acre	Pasture Equivalent	
			Actual (lbs.)	Expected (lbs.)		Per Pig Day (lbs.)	Per Acre (lbs.)
Ladino	S. C. P.*	.90	2.74	3.14	2295	.40	918
Ladino	S. C.	.87	2.34	3.04	2371	.70	1660
Ladino	L. C. P.	.48	1.00	1.78	2375	.78	1852
Ladino	L. C.	.49	1.00	1.75	2401	.75	1801
Lespedeza	S. C. P.	1.18	3.91	4.04	1196	.13	155
Lespedeza	S. C.	.62	2.71	2.23	1044	-.48	-501
Lespedeza	L. C. P.	.25	1.00	1.04	1206	.04	48
Lespedeza	L. C.	.27	1.00	1.10	1081	.10	108

*S.C.P. = Self-fed corn and protein supplement
S.C. = Self-fed corn
L.C.P. = Limited-fed corn and supplement
L.C. = Limited-fed corn

1952 Investigations

Procedure - 1952

Tests conducted prior to 1952 were in the same lots. Every effort to obtain a stand of lespedeza and to maintain a stand of reseeding crimson clover had met with failure. Even with strict management practices, the ladino clover stand was being replaced by native grasses. It was decided in the Winter of 1951-1952 that new sites were necessary for the continuation of these pasture studies. Some grazing was expected from the old ladino clover lots but the lespedeza test had to be located in a different area. Four, one-half acre lots, were also fenced for additional ladino clover pastures in an area not previously used in the test.

An area 500 feet long and 125 feet wide was used for the lespedeza pastures. Small grain was seeded on this area in March 1952, and when the small grain was approximately three inches in height, lespedeza was seeded on the small grain and raked in. From this method of seeding, an excellent stand of small grain and lespedeza was obtained. In June 1952, the small grain was harvested and the straw removed for use as bedding. The lespedeza field was then divided into four equal size lots 125 feet x 125 feet. Grazing of these lots started on July 17, 1952, and continued until the conclusion of the test on September 15, 1952. There was an abundance of lespedeza for grazing throughout the entire test.

Litters with a minimum of four pigs were paired and randomized to the two kind of pastures. Nine pigs were put in each of the lespedeza

and ladino clover lots.

Feeding treatments of the animals on this test were the same as 1950, self feeding for the high levels of nutrition and one pound of concentrates per head daily for the low levels of nutrition (see Tables 3 and 4).

Previous estimates of the feeding value of the two pastures had been made without regard to the weight of the animals in pasture or dry lots. An attempt had been made to have the same weight distribution of different sized pigs in all experimental lots but considerable variation among lots occurred from sampling and also from differences in growth rate. Thus, it was impossible to accurately estimate the feed consumption in dry lot of an animal weighing 35 pounds when the animal was being self-fed with other animals which weighed as much as 65 pounds. Rough estimates were made based on the average feed consumption in each dry lot and these averages used to calculate expected feed intake by pigs on pasture.

In 1949, pigs fed at the high level were fed daily an amount of feed equal to four per cent of their body weight and pigs fed at the low level were fed an amount of feed equal to two per cent of their body weight. Animals in dry lot and on pasture were fed once daily. Feed consumption varied as body weight decreased or increased, since the amount of feed fed each lot of pigs was computed after each two-week weight was recorded. Therefore, lots of pigs that gained most rapidly received the greatest increase of feed in the next weigh period while those with low gains were held back because of small increases in feed

provided them. Before this test was concluded, it was obvious that a new approach to this problem was necessary, if an accurate estimate of the feeding value of the pastures was to be obtained.

In 1950 animals fed at the high level were self-fed and those fed at the low level were fed at the rate of one pound of concentrates per pig daily irrespective of body weight. According to accepted feeding standards one pound of feed per day would promote some growth with weanling pigs and be slightly above maintenance for older ones. Animals on pasture, fed at the rate of one pound per head per day, would obviously receive additional nutrients from grazing. The difference between the average daily gains of the animals in dry lot and on pasture provided an estimate of the feed produced by the pastures. From the regression of feed consumption on average daily gain in dry lot the expected feed consumption for each lot of pasture pigs on the basis of average daily gain was calculated. The actual feed consumption was substracted from the expected feed consumption, the remainder multiplied by the number of pigs per acre to obtain an estimate of the feed replaced by an acre of pasture.

This method of estimating the feeding value of pasture had certain serious limitations. Errors developed when feed consumption was calculated for animals fed at both the high and low level of nutrition. At the high level of feeding, both on pasture and in dry lots, it was assumed that all animals in a given lot consumed the same amount of feed and the average daily feed consumption for the lot was used to compute the feeding value of the pasture. Actually the weights of the animals

in each lot were spread over a wide range and the feed consumption of light weight pigs was less than that of the heavier animal, even if gains were the same, because of differences in maintenance requirements.

Considerable weight difference occurred in each lot of pigs fed at the low level. These animals were hand-fed in troughs and since animals of different weights were fed together in the same lot, it was impossible to insure each animal its proportionate share of the feed. Feed intake was decreased or increased, depending on the weight of the animal, because the larger animals forced the smaller animals away from the feed troughs.

A new method of feeding was introduced for the 1952 test in an attempt to eliminate some of the errors which had occurred in previous tests. Pigs fed in dry lots, at both high and low levels of nutrition, were grouped according to initial weight. The weight ranges for grouping were arbitrarily selected as follows:

1. Pigs weighing under 45 pounds
2. Pigs weighing 46 through 55 pounds
3. Pigs weighing 56 through 65 pounds

Since pigs were from 10 to 12 weeks of age when they went on the experiment, these classes included all pigs. After the animals available for dry lot feeding were grouped by weights, individuals within each weight group were randomized to the feeding treatments. Records of feed consumption and gains were kept for each weight group. It was believed that this method of grouping and feeding dry lot pigs would give much more accurate estimates of the average daily feed consumption than had

been obtained in previous studies. This method also considered weight as a factor in feed consumption.

When the test was concluded, actual feed consumption and total gains was available for each of the weight groups of pigs in dry lots both self-fed and limited fed. The assumption was made that animals on pasture would have an expected total feed consumption equal to that of the animals in dry lot, providing they were in the same weight group and got the same feeding treatment.

To obtain an estimate of the feeding value of the two kinds of pastures, it was necessary that data collected from the self-fed and limited-fed be handled separately. Direct comparison could be made between pigs self-fed in pasture and in dry lot since feed consumption and daily gains were somewhat similar. This was not the case with the limited fed pigs. The feed consumption of concentrates was the same but the average daily gains were significantly different. The methods used to estimate the feeding value of the pasture, at the two levels of feeding, will be discussed separately.

Self-fed

The average weight and feed consumption for each group of the dry lot pigs was calculated by two week periods and plotted as shown in Figure 2. These data indicated that the different groups had about the same feed consumption for all groups when weight was the same. The regression of average feed consumption on average weight per period was computed for each group of self-fed dry lot pigs. From the regression line the trend of feed consumption with weight was calculated and

tabulated (Table 8) for computing expected feed consumption of pasture pigs.

A chart was prepared from the regression curve (Figure 2) for expected feed consumption to nearest pound for the range from 38 to 231 pounds live weight. A sample of this chart is shown in Table 8.

The next step was to calculate the expected feed consumption of the pigs on pasture. This was done on an individual pig basis by weights at the beginning and end of each weigh period (2 weeks). An expected feed consumption for the initial weight of the pig and an expected feed consumption for the pig the next time it's weight was recorded was calculated based on data obtained from dry lot pigs. The two expected feed consumption values were averaged, the average being an estimate of the daily feed consumption of the animal for the period. This average was multiplied by the number of days in the period; the product was an estimate of the expected feed consumption of the animal for that period. The expected feed consumption for each animal was computed by periods, the sums of which were an estimate of the expected feed consumption for all animals in each pasture lot. An example of this method of calculation follows:

	Initial Weight	Second Weight	Third Weight	Total Feed Consumption (lbs.)
Pig No. 2361	60	75	98	
Expected feed consumption	3.21	4.01	5.03	
Average at beginning and end of period		3.61	4.52	
Days in period		14	14	
Expected feed consumed in period		50.5	63.3	113.8
Actual feed consumption		46.1	52.5	98.6
Feed replaced by pasture		4.4	10.8	15.2

Actual feed consumption for all pigs on pasture was recorded by periods, the sum of which resulted in the total feed consumption of all pigs on pasture throughout the entire testing period. The difference between the total feed actually consumed and that expected if the pigs had been fed in dry lot was the estimated feed replacement value of the pasture where pigs were self-fed. Estimates were computed on a per acre basis.

Table 8

Expected Feed Consumption for Pigs of Different Weights Based on Data Obtained from Figure 2 - 1952

Pig Weight (lbs.)	Average Daily Feed Consumption (lbs.)	Pig Weight (lbs.)	Average Daily Feed Consumption (lbs.)
38	1.95	57	2.80
39	2.00	58	2.85
40	2.04	59	2.89
41	2.08	60	2.93
42	2.13	61	2.98
43	2.18	62	3.02
44	2.22	63	3.07
45	2.26	64	3.02
46	2.31	65	3.16
47	2.35	66	3.21
48	2.40	67	3.26
49	2.44	68	3.30
50	2.49	69	3.34
51	2.54	70	3.39
52	2.58	71	3.44
53	2.62	72	3.48
54	2.67	73	3.52
55	2.72	74	3.56
56	2.76	75	3.60

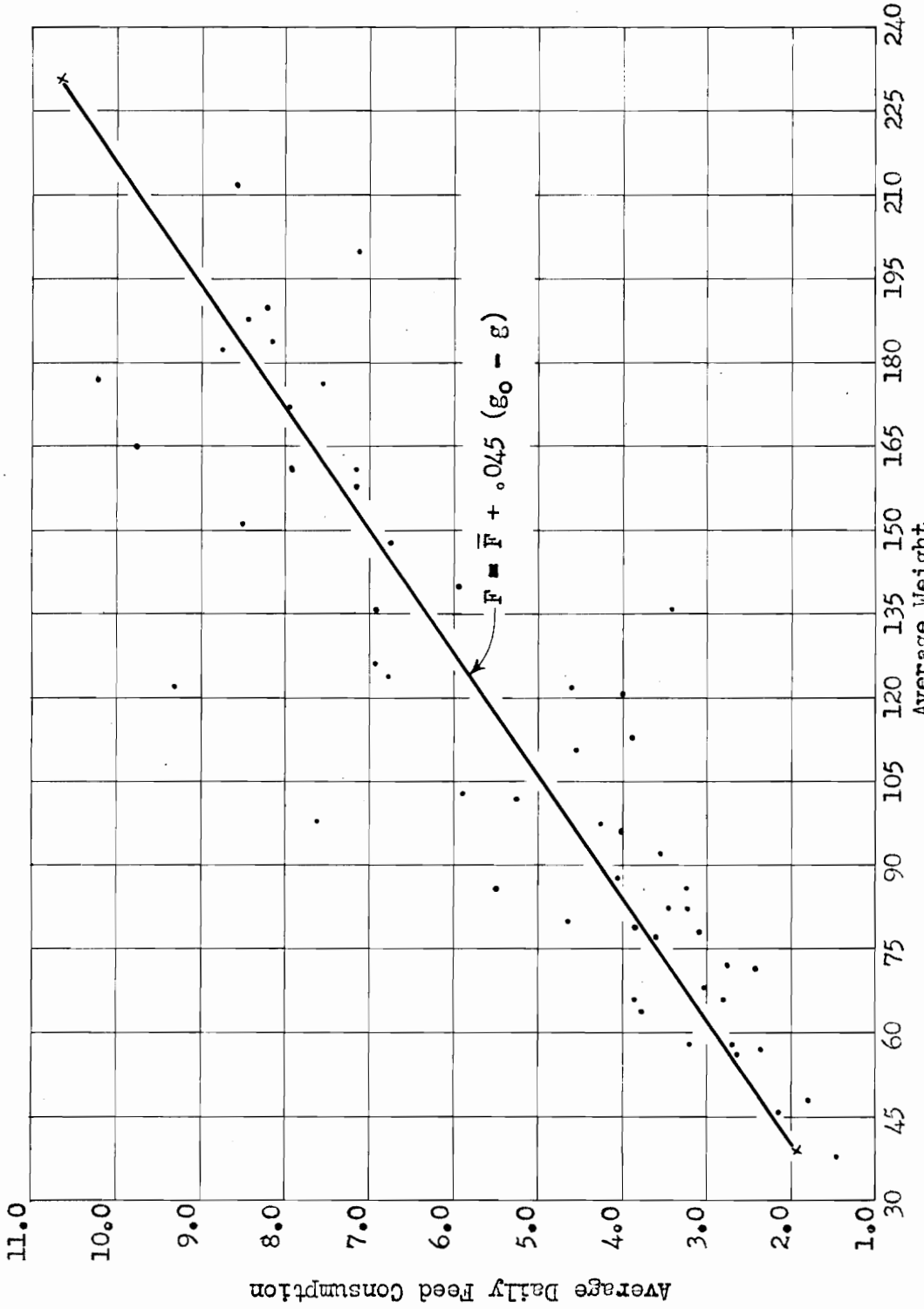

FIGURE 2 REGRESSION OF AVERAGE WEIGHT ON AVERAGE DAILY FEED CONSUMPTION - 1952

Limited-fed

Limited-fed pigs in dry lot and on pasture were hand-fed one pound of concentrates per head daily. Animals were grouped according to weights with grouping being made in the same manner as were the self-fed pigs in dry lot. While there was much variation in daily gain at different weights the general trend was upward and average daily gain and weight was calculated for groups of animals weighing less than 80 pounds, 81 through 115 pounds and 116 through 160 pounds. Feed consumption and average daily gain of self-fed pigs in dry lot, for 63, 95 and 135 pounds average weight, were 3.07 and 0.92, 4.52 and 1.18 and 6.31 and 1.62 pounds respectively. (See Figure 3).

Average feed consumption was 4.87 pounds per head daily and average daily gain was 1.24 pounds for the three dry lot weight groups. Feed required per pound of gain above limited fed dry lot pigs was computed by substracting the average daily feed consumption of the limited fed dry lot pigs from the average daily feed consumption of the three dry lot self-fed weight groups and dividing by the average daily gain of the self-fed dry lot groups, minus the average daily gain of the limited-fed dry lot groups.

Thus: Feed required per pound of gain $= \frac{4.87 - 1.00}{1.24 - 0.17} = 3.61$

From this, the feed required per pound of gain was taken as 3.6 pounds.

It was necessary that the feed required per pound of gain above maintenance be estimated. This was accomplished by using the average gain and feed consumption of pigs at the following weights:

Average Weight	Daily Gain	Feed Consumption
63	.92	3.07
95	1.18	4.52
135	1.62	6.31

The feed required per pound of gain above maintenance was estimated by obtaining the difference in feed consumption and average gain of limited-fed and self-fed pigs in dry lot and came out as follows:

$$\text{For } 63 \text{ pound pig} = \frac{3.07 - 1.00}{.92 - 0.17} = 2.76$$

$$\text{For } 95 \text{ pound pig} = \frac{4.52 - 1.00}{1.18 - 0.17} = 3.48$$

$$\text{For } 135 \text{ pound pig} = \frac{6.31 - 1.00}{1.62 - 0.17} = 3.66$$

The approximate feed required per pound of gain above maintenance for a 60 pound pig was 2.6 pounds. Feed requirement increased at the rate of 0.13 pound of feed per pound of gain for each increase in weight of one pound. As the average weights of the limited-fed pigs on pasture ranged from 22 to 114 pounds the approximate average feed requirement for each pound of gain above maintenance (3.6 pounds of feed per pound of gain) was considered to be a good value for estimating feed production of pasture where concentrates were limited.

The average daily gain for all limited-fed dry lot pigs was 0.17 pounds. It was observed that one pound of concentrates per head daily was slightly above maintenance for these animals. To estimate the feed replacement value of the pasture it was assumed that 0.17 pounds of

the daily gain made by pasture pigs was the direct result of the one pound of concentrates fed them and that daily gain above 0.17 pounds was the direct result of the pasture. Gain acquired by the animals from concentrates provided them was calculated by multiplying 0.17 pounds (average daily gain of limited-fed dry lot pig) by the number of pig days provided by the pasture. The product was an estimate of the pounds of gain made by pasture pigs from the concentrates fed them during the entire testing period. Total gain of the pasture pigs was tabulated by lots. The difference between the total gain and the gain made from concentrates was an estimate of the gain made from pasture. Gain made from pasture was multiplied by 3.6 (pounds of feed required per pound of gain). The product was an estimate of the feed replacement value of the pasture.

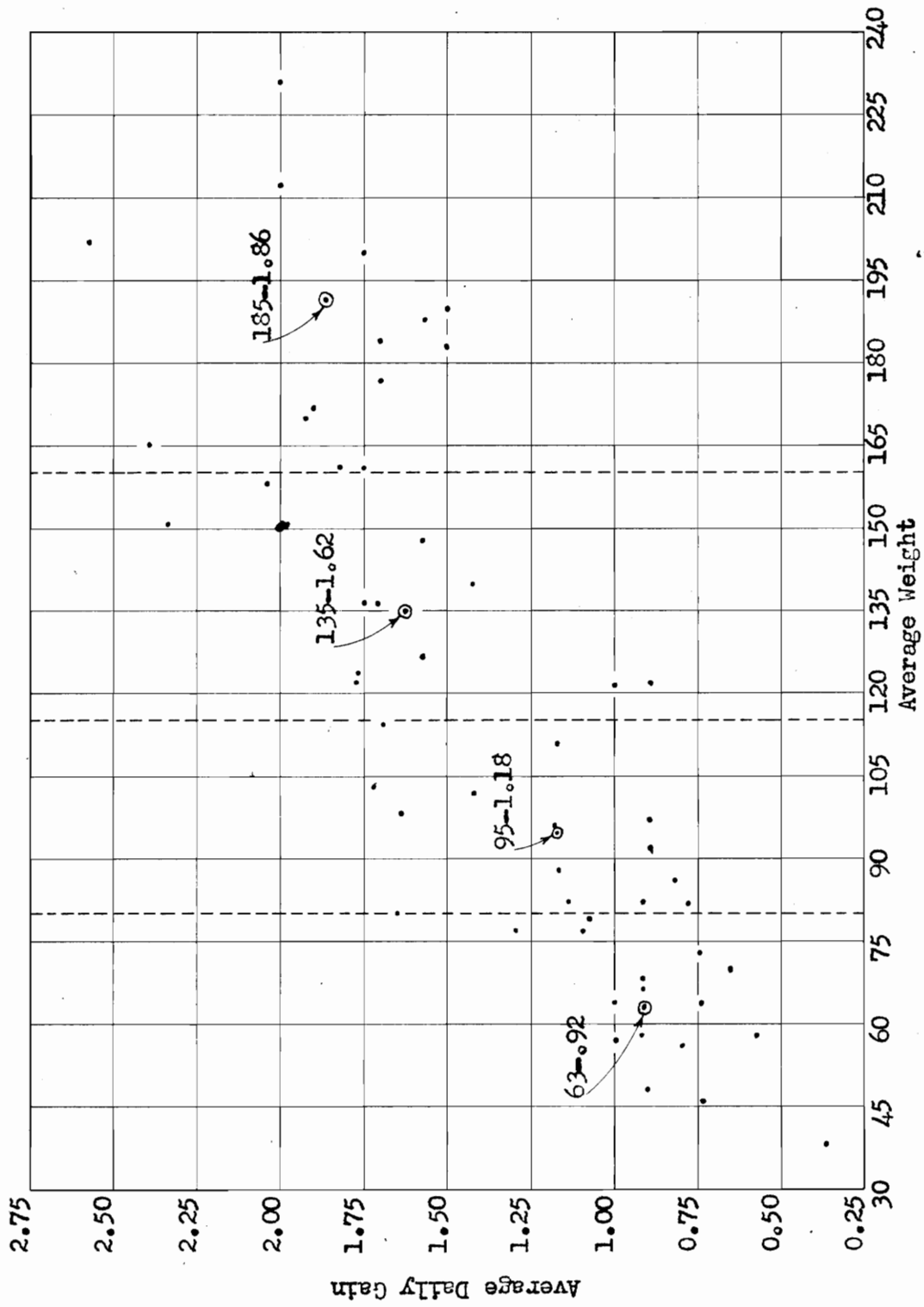

FIGURE 3 AVERAGE DAILY GAIN AND AVERAGE WEIGHT OF GROUPS OF PIGS SELF-FED IN DRY LOTS - 1952

Results - 1952

The ladino clover test was started on May 28, 1952, using the old pastures which had been prepared for the initial test in 1949. On June 25, 1952, all animals were removed from these lots because of an insufficient amount of clover and were put in a new ladino clover pasture. The new ladino clover pasture lots were 1/2 acre in size. The lespedeza grazing test was started on July 17, 1952, in lots 1/3 acre in size. The ladino and lespedeza grazing test was concluded on September 15, 1952.

Comparisons made between pigs on the two kinds of pasture and in dry lots gave essentially the same results as had been obtained in previous test. An excellent stand of lespedeza was obtained for the study and pigs grazing lespedeza made slightly higher gains than had been the case in previous test. Average daily gains of limited-fed pigs on lespedeza pasture were approximately .2 of a pound higher than similar fed pigs in dry lot and .1 of a pound less than similar fed pigs on ladino clover pasture. The performance of self-fed pigs on pasture and in dry lot was about the same as had been obtained in 1949 and 1950.

Estimates of the feed replacement value of the pastures were made by using the average weight of all pigs in the lot within weigh periods to obtain the expected feed consumption. Since the weights of the individuals differed considerably, this method was abandon and feed consumption based on individual weights for the period was used to obtain estimates. Results obtained from this method of computing estimated feed replaced by the pasture are believed to be more accurate than

those obtained from previous tests, because feed consumption was estimated by comparing animals of similar weight in dry lot and on pasture.

A summary of estimated feed replaced by the two kind of pasture, with animals being fed at the high and low level of nutrition, is shown in Tables 9 and 10 respectively. Observations were:

1. Pastures replace more feed when pigs are fed at a low level of nutrition than when fed at a high level of nutrition. The average feed replacement value of pasture for pigs fed at the high level was 592 pounds per acre while the average feed replaced when pigs were fed at the low level of nutrition was 1296 pounds per acre.

2. At the low level of nutrition, the addition of a protein supplement to the ration failed to significantly increase the feed replaced by the two kinds of pasture.

3. At the low level of nutrition, the average feed replaced by ladino pasture was slightly higher than the average feed replaced by lespedeza pasture. The average feed replaced by ladino and lespedeza pasture was 1577 and 1015 pounds per acre respectively.

4. At the high level of nutrition, this test indicated that lespedeza replaced more feed than ladino clover. The average feed replaced by ladino and lespedeza pasture was 305 and 880 pounds per acre respectively.

Table 9

Estimation of the Feed Replacement Value of Pasture with Different Feed at the High Level-1952

Pasture Lots	Feed Consumption Per Lot (Pounds) Actual	Expected	Feed Replacement Value of Pasture Per Lot	Size of Lot (Acre)	No. Pigs Per Lot	Pig Days Per Lot	Feed Replacement Value of Pasture Per Acre (lbs.)
Ladino-high ration with supplement	3355	3647	292	.50	9	655	584
Ladino-high ration without supplement	3372	3385	13	.50	9	688	26
Lespedeza-high ration with supplement	3172	3511	339	.36	9	594	942
Lespedeza-high ration without supplement	2801	3096	295	.36	9	594	819

Table 10

Estimation of the Feed Replacement Value of Pasture with Different Feed at the Low Level-1952

	Pigs Per Lot	Pig Days	Feed Consumption	Gains (Pounds) From Concentrates	Gains (Pounds) From Pasture	Gains (Pounds) Total	Feed Required Lb/Gain Above Maintenance	Lot Size (Acre)	Feed Replacement Value Per Lot	Feed Replacement Value Per Acre
Ladino L. C. P.*	9	714	714	121	223	344	3.6	.50	803	1606
Ladino L. C.	9	648	648	110	215	325	3.6	.50	774	1548
Lespedeza L. C. P.	9	594	594	101	91	192	3.6	.36	328	911
Lespedeza L. C.	9	533	533	91	112	203	3.6	.36	403	1119

*L. C. P. = Limited fed corn and supplement
L. C. = Limited fed corn

1953 Investigation

Procedure - 1953

Swine pasture investigations during the summer of 1953 were designed similar to the studies conducted in 1952. Four ladino clover lots, one acre in size, were fenced off in a two year old pasture and four .8 acre lots of lespedeza were prepared in an area which had been seeded to spring oats. The oats were seeded for grain and straw which was to be used for future feeding of sows and bedding at farrowing time.

Litters with a minimum of four pigs were paired and randomized to the two kind of pastures. Ten pigs were put in each of the lespedeza lots and 11 pigs were put in each of the ladino clover lots.

Feeding treatments of the animals on this test were the same as 1950, self-feeding for the high levels of nutrition and one pound of concentrates per head daily for the low levels (see Tables 3 and 4). Pigs fed in dry lot at both the high and low levels of nutrition were grouped according to initial weight. The weight ranges for grouping were arbitarily selected as follows:

1. Pigs weighing under 45 pounds
2. Pigs weighing 46 through 55 pounds
3. Pigs weighing 56 through 65 pounds
4. Pigs weighing over 65 pounds

Since pigs were from 10 to 12 weeks of age when they went on the experiment, these classes included all pigs. After the animals available for dry lot feeding were grouped by weights, individuals within

each weight group were randomized to the feeding treatments. Feed consumption and gain were recorded periodically for each group. Comparison of feed consumption and gain of pigs fed in dry lot and pigs on pasture were made using the same method as was employed in the 1952 test and weight was considered as an important factor in estimating feed consumption.

The average weight and average feed consumption for each group of self-fed dry lot pigs was calculated by two week periods. These data indicated that different groups had about the same feed consumption for all groups when weight was the same. As the trend was not linear a smooth curve was fitted to these points from visual observations (see Figure 4). From this curve, the trend of feed consumption with weight was calculated and tabulated for computing expected feed consumption of pasture pigs.

A chart was prepared from the eye fitted curve for expected feed consumption to the nearest pound for the range from 32 to 235 pounds live weight. A sample of this chart is shown in Table 11.

Estimates of the feed replacement value of the pasture were calculated using the same methods as were used for the 1952 experiment.

Estimates of the feed replacement value of the pasture for limited fed pigs was computed in a manner similar to the method used in 1952. As was the case in the 1952 test, there was much variation in daily gain at different weights. The trend was upward and average daily gain and average weight was calculated for the individual self-fed dry lot weight groups. Feed consumption and average daily gain of self-fed

pigs in dry lot for 63, 96 and 137 pounds average weight, was 3.38 and 1.08, 4.90 and 1.35, and 6.24 and 1.59 pounds respectively (see Figure 5).

Average feed consumption was 4.84 pounds per head daily and average daily gain was 1.34 pounds for the three dry lot weight groups. Feed required per pound of gain above limited-fed dry lot pigs was computed by substracting the average daily feed consumption of the limited-fed dry lot pigs from the average daily feed consumption of the three dry lot self-fed weight groups and dividing by the average daily gain of the self-fed dry lot groups minus the average daily gain of the limited-fed dry lot groups as follows:

$$\text{Feed required per pound of gain} = \frac{4.84 - 1.00}{1.34 - 0.14} = 3.20$$

The feed required per pound of gain was taken as 3.2 pounds.

The feed required per pound of gain above maintenance was estimated using the average gain and feed consumption of pigs at the following weights:

Average Weight	Daily Gain	Feed Consumption
63	1.08	3.38
96	1.35	4.90
137	1.59	6.24

The feed required per pound of gain above maintenance was estimated by obtaining the difference in feed consumption and average gain of limited-fed and self-fed pigs in dry lot.

Calculation of the feed required per pound of gain above maintenance was as follows:

$$\text{For } 63 \text{ pound pig} = \frac{3.38 - 1.00}{1.08 - 0.14} = 2.53$$

$$\text{For } 96 \text{ pound pig} = \frac{4.90 - 1.00}{1.35 - 0.14} = 3.22$$

$$\text{For } 136 \text{ pound pig} = \frac{6.24 - 1.00}{1.59 - 0.14} = 3.61$$

The approximate feed required per pound of gain above maintenance for a 60 pound pig was 2.5 pounds. Feed requirement increased at the rate of 0.15 pound of feed per pound of gain for each increase in weight of one pound. Since the average weights of the limited-fed pigs on pasture range from 54 to 110 pounds, the average feed requirement for each pound of gain above maintenance was 3.20 pounds of feed per pound of gain.

The average daily gain for all limited-fed dry lot pigs was 0.14 pounds. It was observed that one pound of concentrates per head daily was slightly above maintenance for these animals. To estimate the feed replacement value of the pasture it was assumed that 0.14 pounds of the daily gain made by pigs on pasture was the direct result of the one pound of concentrates fed them and that daily gain above 0.14 pounds was the direct result of the pasture. Gain acquired by the animals from concentrates provided them was calculated by multiplying 0.14 pounds (average daily gain of limited-fed dry lot pigs) by the number of pig days provided by the pasture. The product was an estimate of the pounds of gain made by pasture pigs from the concentrates fed them during the

entire testing period. Total gain of the pasture pigs was tabulated by lots. The difference between the total gain and the gain made from concentrates was an estimate of the gain made from pasture. Gain made from pasture was multiplied by 3.2 (pounds of feed required per pound of gain). The product was an estimate of the feed replacement value of the pasture, which was then computed on a per acre basis and is shown in Tables 12 and 13.

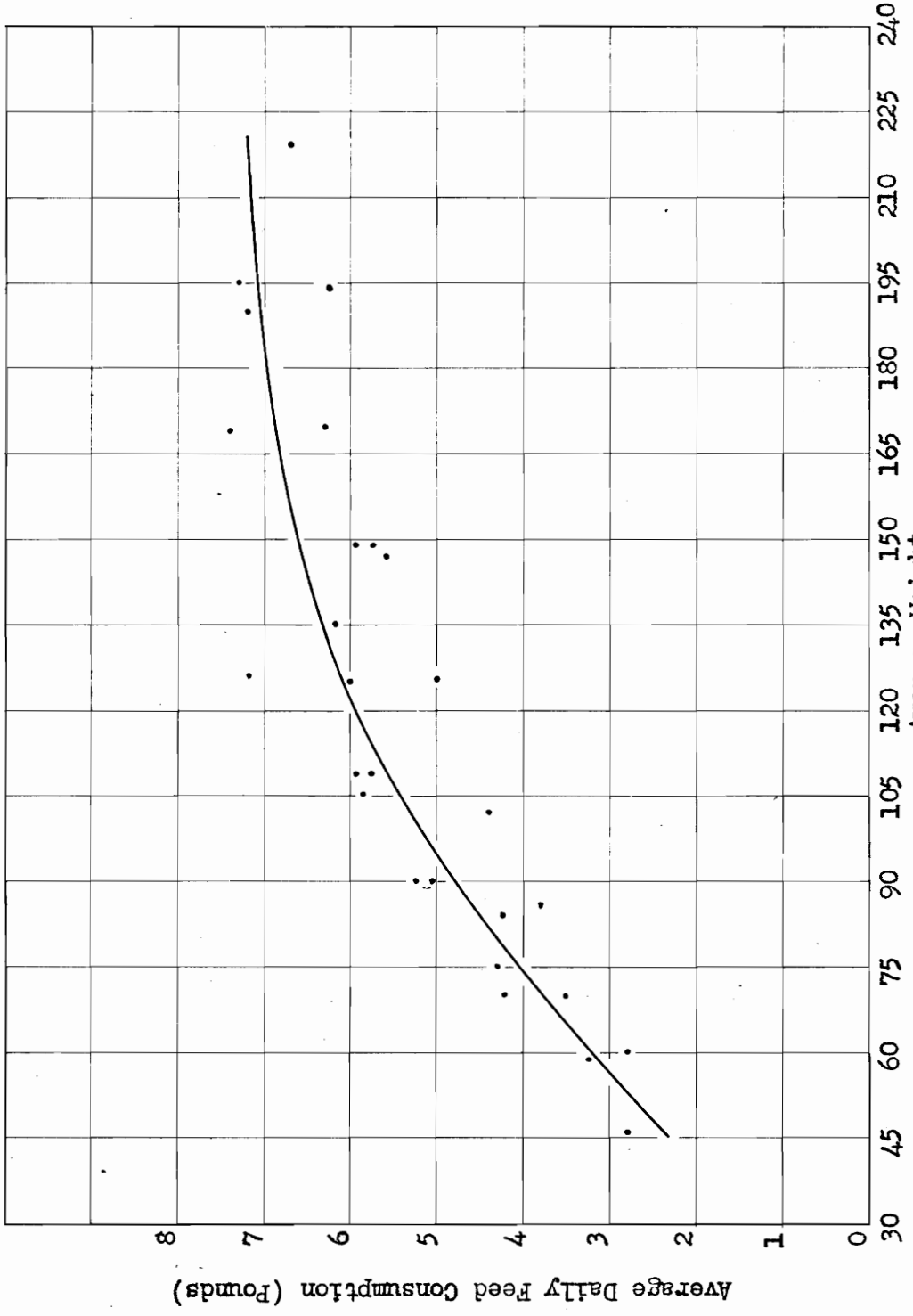

FIGURE 4 EYE FITTED CURVE OF WEIGHT AND AVERAGE DAILY FEED CONSUMPTION FOR SELF-FED PIGS IN DRY LOT - 1953

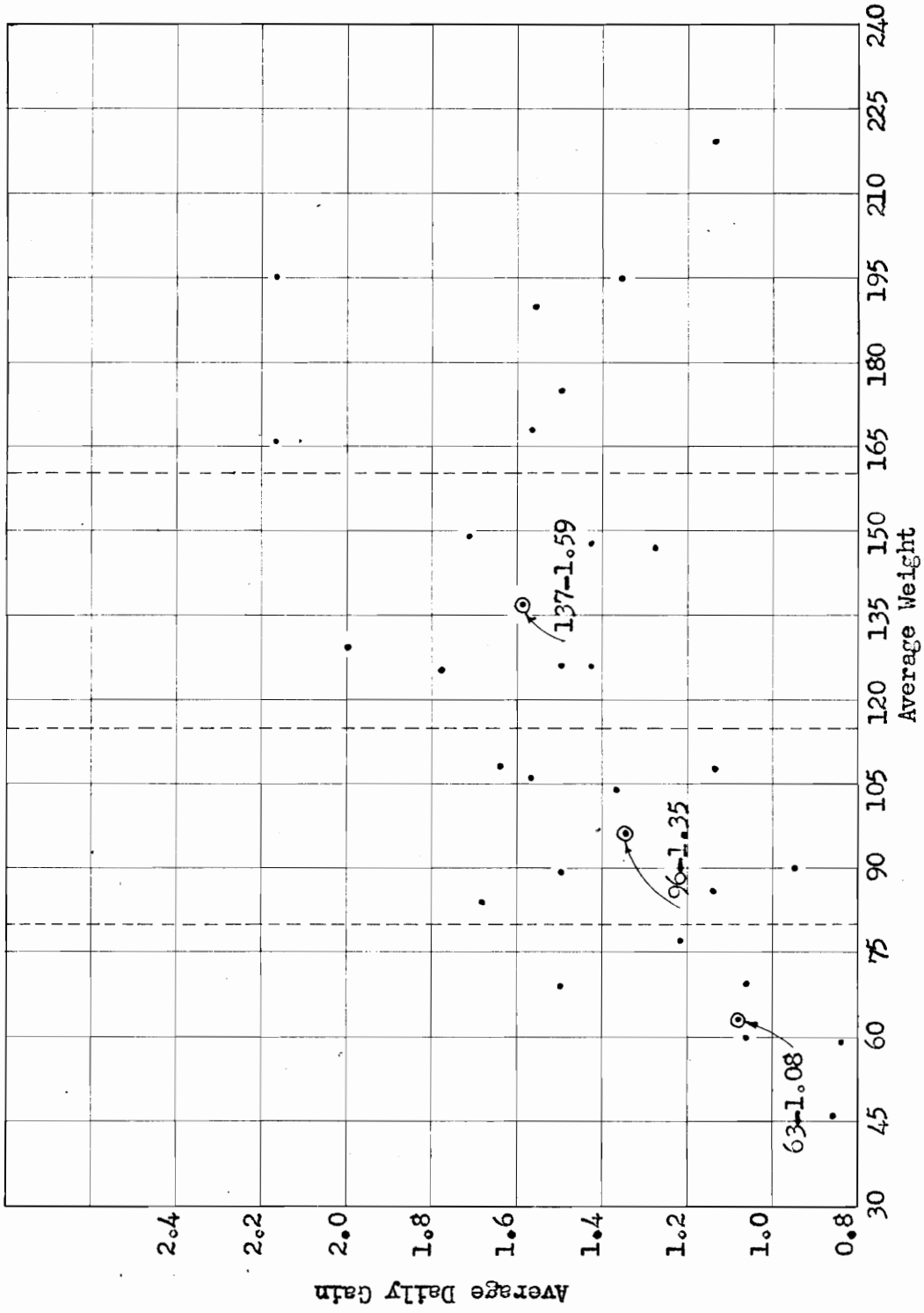

FIGURE 5 AVERAGE DAILY GAIN AND AVERAGE WEIGHT OF GROUPS OF PIGS SELF-FED IN DRY LOTS - 1953

Table 11

Expected Feed Consumption for Pigs of Different Weights Based on Data Obtained from Figure 4 - 1953

Pig Weight (lbs.)	Average Daily Feed Consumption (lbs.)	Pig Weight (lbs.)	Average Daily Feed Consumption (lbs.)
30	1.50	49	2.58
31	1.56	50	2.64
32	1.61	51	2.70
33	1.67	52	2.76
34	1.73	53	2.81
35	1.78	54	2.87
36	1.84	55	2.93
37	1.90	56	2.98
38	1.96	57	3.04
39	2.01	58	3.10
40	2.07	59	3.16
41	2.13	60	3.21
42	2.18	61	3.27
43	2.24	62	3.33
44	2.30	63	3.38
45	2.36	64	3.44
46	2.41	65	3.50
47	2.47	66	3.55
48	2.53	67	3.60

Table 12

Estimation of the Feed Replacement Value of Pasture with Different Feed at the High Level-1953

Pasture Lots	Feed Consumption Per Lot (Pounds) Actual	Expected	Feed Replacement Value of Pasture Per Lot	Size of Lot (Acre)	No. Pigs Per Lot	Pig Days Per Lot	Feed Replacement Value of Pasture Per Acre (lbs.)
Ladino-high ration with supplement	6016	6109	93	1.00	11	1078	93
Ladino-high ration without supplement	4805	5708	903	1.00	11	1078	903
Lespedeza-high ration with supplement	4185	4827	642	.80	10	942	802
Lespedeza-high ration without supplement	4163	4749	586	.80	10	928	732

Table 13

Estimation of the Feed Replacement Value of Pasture with Different Feed at the Low Level-1953

	Pigs Per Lot	Pig Days	Feed Consumption	Gains (Pounds) From Concentrates	Gains (Pounds) From Pasture	Gains (Pounds) Total	Feed Required Lb/Gain Above Maintenance	Lot Size (Acre)	Feed Replacement Value Per Lot	Feed Replacement Value Per Acre
Ladino L. C. P.*	11	1078	1078	151	427	578	3.2	1.00	1366	1366
Ladino L. C.	11	1078	1078	151	405	556	3.2	1.00	1296	1296
Lespedeza L. C. P.	10	980	980	137	292	429	3.2	.80	934	1168
Lespedeza L. C.	10	980	980	137	272	411	3.2	.80	870	1088

*L. C. P. = Limited fed corn and supplement
L. C. = Limited fed corn

Results - 1953

These tests were started on June 2, 1953, and concluded on September 9, 1953. Grazing was abundant on the lespedeza pastures throughout the entire test. Observation indicated that lespedeza was less palatable than ladino clover and grazing was limited in these lots where sufficient concentrates were provided the animals. The ladino pastures were heavily grazed by the pigs on limited rations and some grazing was observed by the pigs fed at the high level of nutrition. In order to insure adequate grazing for pigs fed at the low level of nutrition on ladino pastures it was necessary that the pasture be rotated. Grazing by pigs on ladino pasture could have been started on April 1, 1953, however, pigs were not available for starting the test and it was decided that the lespedeza and ladino pasture studies should begin simultaneous and that they would commence as soon as the growth of the lespedeza would permit grazing.

Comparisons made between pigs on the two kinds of pastures and in dry lots gave essentially the same results as had been obtained in previous tests. An excellent stand of lespedeza was obtained for the study. Average daily gain of limited-fed pigs on lespedeza pasture was approximately three tenths of a pound higher than similar fed pigs in dry lot and one tenth of a pound less than similar fed pigs on ladino pasture. The performance of self-fed pigs on pasture and in dry lot was about the same as had been obtained in 1952.

Estimates of the expected feed consumption of the pigs were based on individual weights by periods using the same procedure as was used

in 1952. A study of the results of this indicated:

1. Pastures replace more feed when animals are fed at a low level of nutrition than when fed at a high level of nutrition. The average feed replaced by the pastures, when pigs were fed at the high and low level of nutrition, was 632 and 1230 pounds per acre respectively.

2. At the high level of nutrition, the amount of feed replaced by the two kind of pastures was essentially the same. Exceptions occurred where pigs on ladino pasture were self-fed a ration of corn and supplement. The feed replaced by the pasture was 93 pounds per acre as compared with an average of 812 pounds per acre for all remaining groups of pigs on pasture fed at the high level of nutrition.

3. At the low level of nutrition the amount of feed replaced by the two kind of pastures showed slight differences in favor of ladino pasture.

Estimates of the feed replaced by the pastures in 1953 were obtained by using two different methods of computation. One method, used in 1949, utilized the regression of feed consumption on average daily gain. The 1952 method involved the comparison of feed consumption, daily gain and total gain of similar weight pigs in dry lot and in pasture. Comparisons of the two methods of estimation resulted in the following observations (see Table 14):

A. At the high levels of nutrition, the 1949 method of estimating the feed replaced by the pasture, was consistantly lower than that obtained by the method used in 1952. Negative values were obtained by

the 1949 method and positive values were obtained by the 1952 method.

B. At the lower level of nutrition, estimates obtained by the method used in 1949 were somewhat similar to those obtained by the method used in 1952.

C. The 1949 and the 1952 methods of computation indicate that a greater amount of concentrates were replaced when pigs were fed at the low level of nutrition than at the high level of nutrition.

Table 14

Comparison of the Methods Used in 1949 and 1952 for Estimating Value of Pasture Using Data from 1953 Test

Pasture Lot	Feeding Treatment	Ave. Daily Gain	Daily Feed Consumption		Pig Days Per Acre	Pasture Equivalent (Estimated)		
			Actual (lbs.)	Expected (lbs.)		1949 Method		1952 Method
						Per Pig Day (lbs.)	Per Acre (lbs.)	Per Acre (lbs.)
Ladino	S. C. P.*	1.45	5.58	5.19	1078	-.39	-420	93
Ladino	S. C.	1.19	4.46	4.36	1078	-.10	-108	903
Ladino	L. C. P.	.54	1.00	2.28	1078	1.28	1380	1366
Ladino	L. C.	.52	1.00	2.22	1078	1.22	1315	1296
Lespedeza	S. C. P.	1.15	4.44	4.23	1178	-.21	-247	802
Lespedeza	S. C.	1.17	4.48	4.30	1160	-.18	-209	732
Lespedeza	L. C. P.	.44	1.00	1.96	1168	.96	1121	1168
Lespedeza	L. C.	.42	1.00	1.90	1088	.90	979	1088

*S. C. P. = Fed at high level with corn and supplement
S. C. = Fed at high level with corn
L. C. P. = Fed at low level with corn and supplement
L. C. = Fed at low level with corn

SUMMARY

Estimates of feed produced by pasture were obtained from pasture investigations at the Tidewater Field Station from 1949 through 1953. Dry lot groups of pigs similar to those fed on pasture and fed similar rations were used to estimate total concentrates necessary for maintenance and gain of pigs on pasture. Feed production of each pasture was estimated from the difference between concentrates consumed by the pigs on that pasture and total concentrates for similar performance in dry lot. Estimates for 1949 and 1950 were based on the regression of feed consumption on average daily gain of pigs fed in dry lot. Weight of the animals was not considered in computing these estimates. In 1952 and 1953 the regression of feed consumption on weight was the basis for estimates when pigs were fed at the high level of nutrition, and feed required per pound of gain above maintenance for similar weight pigs was the basis for estimates, when pigs were fed at the low level of nutrition.

Direct comparisons were made between pigs fed in dry lot and on pasture at the high level of nutrition, since feed consumption and weight were similar. This was not the case with pigs fed in dry lot and on pasture at the low level of nutrition. Feed consumption was the same but average daily gain differed significantly. Since the low level of nutrition provided slight gain for pigs in dry lot, it was necessary that this gain be substracted from the total gain made by pigs on pasture. The net gain was assumed to be the direct result of

the pasture. The feed required per pound of gain above maintenance was calculated and multiplied by the net gain (gain made from pasture), the product being an estimate of the feed replacement value of the pasture lot. Estimations were calculated on a per acre basis.

A summary by years of the feed replaced by the pasture is shown in Table 15. This summary indicated that a more consistant estimate was obtained when weight of the animals was included in estimating expected feed consumption. Exceptions to this occurred in 1952 and 1953 when pigs were self-fed on ladino clover. In 1952, the estimated feed replacement value of the pasture, when pigs were provided supplement, was 584 pounds, while in 1953 the estimate was 93 pounds. When supplement was not included in the ration, the feed replaced by the pasture was 26 and 903 pounds for 1952 and 1953, respectively.

Table 15

Summary by Years of the Estimated Feed Replacement Value of Pasture when Supplemented with Different Feed at the High and Low Level of Nutrition

Pasture Lot	Feeding Treatments*	Feed Replacement of Pasture by Years			
		1949	1950	1952	1953
Ladino	S. C. P.	-10	918	584	93
Ladino	S. C.	249	1660	26	903
Ladino	L. C. P.	764	1852	1606	1366
Ladino	L. C. P.	856	1801	1548	1296
Lespedeza	S. C. P.	00	155	942	802
Lespedeza	S. C.	-58	-501	819	732
Lespedeza	L. C. P.	632	48	911	1168
Lespedeza	L. C.	495	108	1119	1088

*S. C. P. = Fed at high level with corn and supplement
S. C. = Fed at high level with corn
L. C. P. = Fed at low level with corn and supplement
L. C. = Fed at low level with corn

CONCLUSIONS

The information seemed to justify the following conclusions:

1. There is considerable difference between the length of the grazing period of the two kind of pastures in these studies. With normal seasons, grazing can commence on ladino clover pasture on the first of April while grazing on lespedeza is delayed until the first of June. These studies tend to underestimate the feed replaced by ladino pastures, because pigs were not available for grazing in early spring.

2. Indications were that lespedeza compared favorably with ladino clover as a pasture for pigs fed at the high level of nutrition, if good stands of lespedeza were obtained. At the low level of nutrition, pigs on ladino made slightly higher average daily gain and ladino replaced slightly more concentrates than lespedeza.

3. Pastures in these studies replaced more concentrates at the low level of nutrition than at the high level of nutrition.

4. From these data, there is evidence that feed consumption, average daily gain and weight are correlated.

5. Since weight is an important factor in estimating feed consumption, it appears that the method of computing the feed replacement value of the pasture in 1952 and 1953 is superior to the method used in 1949 and 1950 when weight was ignored.

6. Valid comparisons of feed consumption between pigs fed in dry lot and on pasture can be made if weight and average daily gain of the

animals are similar.

7. Direct comparisons were made between individual animals on pasture and animals with similar weight and average daily gain in dry lot. This increased the accuracy of the estimates as compared with the method used in 1949 and 1950, when comparisons were made between groups of animals in dry lot and on pasture, based on the regression of feed consumption on average daily gain of groups of low level and high level fed pigs in dry lot.

8. Although feed consumption and initial weight was similar, for animals fed at the low level of nutrition, average daily gain of pigs on pasture was significantly higher than that of pigs in dry lot. Direct comparisons between pigs fed in dry lot and pigs fed in pasture were not possible. Estimates of the feed replacement value of the pasture were based upon the feed required per pound of gain above maintenance. Accuracy was not obtained in these estimates, because of the difficulty encountered in estimating the maintenance ration for the pigs.

9. Considerable variation occurred in the estimates obtained in 1949 and 1950 and some negative estimates were obtained. Estimates obtained in 1952 and 1953 were rather consistant and all values obtained were positive. Using the 1953 data, when weight was considered as a factor in estimating concentrates replaced by the pasture, all estimates were positive at both the high and low level of nutrition. When weight was ignored, all estimates at the high level of nutrition were negative and at the low level of nutrition were positive.

These data indicate that weight is an important factor in estimat-

ing the feed replacement value of pasture. It appears that more accurate estimates would be obtained, if direct comparisons were made of the feed consumption of pigs fed in dry lot and on pasture. This could be accomplished, if animals in dry lot and on pasture, were similar in weight and were fed to make approximately the same gains.

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ACKNOWLEDGEMENTS

The author wishes to take this opportunity to express his deep appreciation to Dr. C. M. Kincaid, Virginia Agricultural Experiment Station, Blacksburg, Virginia, under whose supervision this study was planned and conducted. Without his constant assistance and advice, the experiments related in this study could not have been conducted. His assistance was essential for the analysis of the results of the experiments and without his helpful suggestions and encouragement, this study could not have been made.

The author also wishes to express his appreciation to Mr. Jack C. Taylor, Beef Cattle Research Station, Front Royal, Virginia, for assuming the duties of the author while he was on leave of absence and to Miss Mildred Ann Carter for typing the manuscript.

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