Pelleted rations for fattening steers with or without additional straw, dynafac, and diethylstilbestrol implants
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Abstract:
This experiment was conducted to study the effect of self-feeding a completely pelleted ration with or without straw, dynafac, and diethyl-stilbestrol (stilbestrol) implants on the gaining ability, feed efficiency, carcass grades, and net returns of fattened steers.

The experimental animals consisted of forty Hereford yearling steers divided into five treatments oh the basis of weight and previous experimental use. The trial was initiated by preventing the steers from having any feed or water for about sixteen hours previous to weighing each steer individually and feeding each group their ration on May 22, 1958. The rations were group hand-fed for about eleven days and then self-fed to the termination of the trial.

The trial consisted of group 1 steers receiving a mixed grain ration and alfalfa hay ad libitum. The pelleted ration fed to steers in groups 2 and 3 consisted of 70 percent grain, a mixture equivalent to that fed to group 1, and 30 percent sun-cured alfalfa. In addition, steers in group 3 received straw ad libitum. The steers in groups 4 and 5 received straw ad libitum and a pellet of the same percent composition as that fed to steers in groups 2 and 3, but which included 200 grams of dynafac per ton. Group 5 steers were implanted with 36 mg of stilbestrol at the outset of the trial.

The trial terminated on October 16, 1958, after a total of 147 days.

The steers were restricted to no feed or water for about sixteen hours previous to weighing them off the trial. They were bought by Armour and Company on a grade-in-yield basis and slaughtered in Spokane.

The steers that received the mixed grain and alfalfa hay had superior gains, carcass grades, and net returns compared to the steers fed the pelleted ration. The pelleted ration intensified rumenal hyperparakeratosis. The steers that received the same pellet as group 2 plus straw ad libitum had improved daily gains, carcass grades, and net returns. The feeding of straw tended to modify rumenal hyperparakeratosis.

The steers which were fed dynafac and straw ad libitum had superior gains, carcass grades, net returns, and minimized rumenal hyperparakeratosis when compared to the steers that were not fed dynafac. The steers implanted with stilbestrol had superior gains and net returns but inferior carcass grades when compared to those steers not implanted with stilbestrol.

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83

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TABLE OF CONTENTS

Index to Tables. 5

Index to Figures. 5

Index to Appendix. 5

Abstract. 6

Introduction. 7

Review of Literature. 8

Concentrate-Roughage Ratio. 8

Factors Associated with Pellet Feeding. 9

Ingredient Type and Quality. 9

Coarseness of Grind. 10

Size of Pellet. 10

Feeding Methods. 11

Need for Additional Roughage. 11

Pelleting Per Se. 11

Digestibility, Rumination, and Palatability. 12

Dynafac. 15

Stilbestrol. 16

Cumulative Effects. 17

Methods and Procedure. 19

Results and Discussion. 25

Daily Gains and Feed Lot Performance. 25

Health. 28

Slaughter Data. 28

Expenses and Returns. 36

TABLE OF CONTENTS (cont'd.)

Summary. 41

Literature Cited. 43

Appendix. 47

INDEX TO TABLES

I. Percent composition of ration used in this trial. 19

II. Treatments used in this trial. 20

III. Summary of weights, daily feed consumption, and feed efficiency by groups. 25

IV. Average daily consumption of grain and hay by groups by twenty-eight day periods. 27

V. The Incidence of rumenal hyperparakeratosis by groups. 30

VI. Relationship between total gain and the incidence of rumenal hyperparakeratosis by groups. 33

VII. USDA carcass grades by groups. 35

VIII. Enroute shrink, cooler shrink, and yield by groups. 36

IX. Summary of expenses and returns by groups. 37

INDEX TO FIGURES

1. General view of self-feeders used in this trial. 21

2. Steers in group 2 eating wood shavings. 29

3. Section of a rumen from a steer of group 1. 31

4. Section of a rumen from a steer of group 3. 32

INDEX TO APPENDIX

I. Quantitative analyses data of the feed used in this trial. 47

ABSTRACT

This experiment was conducted to study the effect of self-feeding a completely pelleted ration with or without straw, dynafac, and diethylstilbestrol (stilbestrol) implants on the gaining ability, feed efficiency, carcass grades, and net returns of fattened steers.

The experimental animals consisted of forty Hereford yearling steers divided into five treatments on the basis of weight and previous experimental use. The trial was initiated by preventing the steers from having any feed or water for about sixteen hours previous to weighing each steer individually and feeding each group their ration on May 22, 1958. The rations were group hand-fed for about eleven days and then self-fed to the termination of the trial.

The trial consisted of group 1 steers receiving a mixed grain ration and alfalfa hay ad libitum. The pelleted ration fed to steers in groups 2 and 3 consisted of 70 percent grain, a mixture equivalent to that fed to group 1, and 30 percent sun-cured alfalfa. In addition, steers in group 3 received straw ad libitum. The steers in groups 4 and 5 received straw ad libitum and a pellet of the same percent composition as that fed to steers in groups 2 and 3, but which included 200 grams of dynafac per ton. Group 5 steers were implanted with 36 mg of stilbestrol at the outset of the trial.

The trial terminated on October 16, 1958, after a total of 147 days. The steers were restricted to no feed or water for about sixteen hours previous to weighing them off the trial. They were bought by Armour and Company on a grade-in-yield basis and slaughtered in Spokane.

The steers that received the mixed grain and alfalfa hay had superior gains, carcass grades, and net returns compared to the steers fed the pelleted ration. The pelleted ration intensified rumenal hyperparakeratosis. The steers that received the same pellet as group 2 plus straw ad libitum had improved daily gains, carcass grades, and net returns. The feeding of straw tended to modify rumenal hyperparakeratosis.

The steers which were fed dynafac and straw ad libitum had superior gains, carcass grades, net returns, and minimized rumenal hyperparakeratosis when compared to the steers that were not fed dynafac. The steers implanted with stilbestrol had superior gains and net returns but inferior carcass grades when compared to those steers not implanted with stilbestrol.

INTRODUCTION

Producers of meat must be ever on the lookout for ways in which to improve the efficiency of and reduce the cost of production. The use of pelleted rations offers the feeder a chance to mechanize a large part of his feed-lot operation. The economical feasibility of feeding completely pelleted rations is dependent upon the cumulative effect of decreasing waste, reducing the labor cost, and improving the efficiency of converting feeds to meat, and increasing net returns in comparison with the increased cost of pelleting.

Most pellet mills require ingredients to be finely ground before being compressed into a pellet. Therefore, it is impractical to contemplate the effect that pelleting may have without first considering the effect that grinding the ingredients has. Thus, pelleting and associated processes may be adverse to one of the purposes of the ruminant digestive system, i.e. break down and utilization of bulky feeds. Both previous to and since the interest in pelleting, researchers have been trying to determine the relationship between bulk in the diet and rumination, rumination and retention of nutrients, and rumination and gaining ability of the animal.

The project reported herein was initiated to study some of the problems related to pelleted rations that are presently plaguing the feeding industry. The primary objectives of this trial were to study the effect of feeding, to yearling steers, a completely pelleted ration, with or without straw ad libitum, dynafac, and diethylstilbestrol (stilbestrol) implants. The characteristics considered important to study were: daily gain, appetite, feed-lot performance, carcass grade, incidence of rumenal hyperparakeratosis, and net returns.

REVIEW OF LITERATURE

CONCENTRATE-ROUGHAGE RATIO

Fattening rations for cattle generally have a wide ratio of concentrates to roughage. Beeson et al. (1957) observed that when steers were self-fed the components of a ration, they selected more concentrates and less hay than was provided for steers hand-fed a mixed ration. The self-fed steers had .22 lb. better daily gain and had substantially better feed efficiency. Webb and Cmarik (1957) found that steers getting a pelleted ration of 65 percent corn and 25 percent timothy-alfalfa hay mixture and 10 percent soybean oil meal had .18 lb. better daily gain and averaged $2.00 more per steer in net returns than similar steers fed a pellet containing equal parts of corn and timothy-alfalfa hay mixture and 10 percent soybean oil meal. Larner (1959) states that he prefers a pellet with a ratio of 70 percent roughage to 30 percent concentrates for fattening steers.

Lamb fattening rations are frequently much lower in energy value than steer fattening rations. A frequently used ratio in lamb rations is 70 percent roughage and 30 percent concentrates. Thomas et al. (1959) found no real difference in daily gain between pelleted rations consisting of 70, 50, and 30 percent roughage with inverse percentages of concentrates.

Bell et al. (1955) using dehydrated alfalfa, observed that a pelleted ration of 65 precent roughage and 35 percent corn produced a daily gain in lambs of .352 lb. whereas a pellet of 55 percent roughage and 45 percent corn produced a daily gain of .228 lb. However, if chopped alfalfa was used in a non-pelleted ration, lambs gained better on the higher concentrate ration of 55 percent alfalfa and 45 percent corn. Botkin et al. (1956)

found that lambs gained as well on rations containing equal parts of barley and alfalfa or 60 percent alfalfa and 40 percent barley.

FACTORS ASSOCIATED WITH PELLET FEEDING

Ingredient Type and Quality

The type and quality of feeds used in formulating a ration are known to cause variation in the effect of pelleting. Cate et al. (1955) did not observe any advantage from pelleting a ration of high-quality alfalfa-meal and corn. However, when a ration of timothy-meal and corn was pelleted, the lambs consuming the pellet ate more, gained faster, and graded higher than lambs consuming the non-pelleted ration. Neal (1953) tested the effect of pelleting on low-quality roughage, and observed that lambs gained faster and more efficiently on a pellet made of low-quality alfalfa and sorghum grain than lambs being fed a non-pelleted ration of high-quality alfalfa and sorghum grain.

Dehydrated alfalfa was reported to be inferior in pelleted rations for lambs at the Colorado Experiment Station, (Anonymous, 1956, and Esplin and Story, 1958). A pellet of equal parts of corn and alfalfa produced superior gains and equal feed efficiency when compared to a pellet of equal parts of dehydrated alfalfa and corn. Menzies et al. (1958) found that lambs gained faster and more efficiently when alfalfa was used in a fattening pellet rather than dehydrated alfalfa.

Esplin and Hazle (1958) observed an improvement in the feeding value of alfalfa when it was dehydrated. Lambs fattened on dehydrated alfalfa pellets had superior gains, carcass grades, and net returns when compared to lambs fattened on sun-cured alfalfa pellets. The fact that no concentrates

were included in the pellet in this trial may be the reason that these results are contradictory to those of Esplin and Story (1958).

Coarseness of Grind

Ensminger et al. (1948) observed no change in daily gain in steers when the roughage component of a meal ration was finely ground. Webb and Cmarik (1957) found that fine grinding of the ingredients of a completely pelleted ration restricted the gaining ability of steers, but not significantly 1/. They noted, however, that steers consuming the coarse-ground pelleted ration returned an average of $16.90, whereas those consuming the fine-ground pelleted ration returned only $4.30.

Noble et al. (1958) observed that chopping and mixing a lamb ration of whole milo and alfalfa improved the daily gain and feed efficiency substantially. Esplin and Hazle (1958) observed that fine grinding ingredients of a completely pelleted ration of equal parts of corn and alfalfa restricted the gaining ability of lambs. Those lambs receiving a ration which had been ground through a 1/16 inch screen gained .433 lb. each day, whereas those receiving the ration that had been ground through a 1/4 inch screen gained .502 lb. each day.

Size of Pellet

Esplin and Hazle (1958) fed lambs a wafer of 1 inch by 1/2 inch and a larger wafer of 1 1/4 inch by 1 1/4 inch by 3/4 inch and a pellet of 1/4 inch by 1/4 inch. They reported that lambs which were fed the two sizes of wafers gained faster than those fed the pellet.

1/ In this manuscript, the term significant denotes statistical significance beyond the 5 percent level of proability and highly significant denotes statistical significance beyond the 1 percent level of probability.

Feeding Methods

Bell et al. (1955) compared group hand-feeding twice daily to individual self-feeding of lambs. They observed that in three of the four comparisons made, hand-fed lambs gained at the faster rate. Beeson et al. (1957) compared hand-feeding a complete mixed ration to self-feeding the components of a ration. They observed that self-fed steers gained significantly faster; and had improved feed efficiency when compared to hand-fed steers. They observed in another trial that self-fed steers had a highly significant improvement in daily gain but no improvement in feed efficiency.

McCroskey et al. (1958) found that feeding the roughage component of a fattening ration ad libitum increased the consumption of roughage and stimulated the gaining ability of calves.

Need for Additional Roughage

Gordon (1958) presented evidence which indicates that sheep need some roughage in the diet in order to support rumination. Sheep receiving one pound and two pounds of roughage daily ruminated about seven hours. However, when a diet of all concentrates was fed rumination time decreased to two and one-half hours.

Bush and Jordan (1956) found that lambs on a completely pelleted ration craved more bulk as manifested by their consuming the straw which was made available for bedding.

PELLETING PER SE

Thomas et al. (1954) found that lambs fed a pelleted ration had no real improvement in daily gain but net returns were reduced when compared to lambs that were fed whole grains and alfalfa. Thomas et al. (1959) and

Botkin et al. (1956) observed that, compared to a ground mixed ration, lambs fed pelleted rations gained at a somewhat faster rate; however, the work of Thomas et al. (1959) showed that lambs consuming the pelleted rations returned substantially less net returns. Esplin et al. (1956) showed only a non-significant difference in daily gain favoring pelleted rations in several trials but a highly significant difference in one trial.

Noble et al. (1954) found that lambs consuming a pelleted ration had insufficient improvement in daily gain and feed efficiency to compensate for the increased cost of pelleting. However, Noble et al. (1953) reported that lambs fed a pelleted ration gained equal to and had considerably more efficient feed conversion than similar lambs fed a ground mixed ration. The pellet-fed lambs sold for a higher price and had greater net returns.

Whiteman et al. (1955); Anonymous (1954); Menzies et al. (1958); and Botkin and Paules (1955) found a highly significant difference in daily gain in lambs favoring pelleted rations; however, carcass grades and net returns were adversely affected.

Ensminger et al. (1948) observed that steers, receiving pelleted ground grass hay with a limited amount of chopped grain, had superior gains and feed efficiency when compared to steers which received the grass hay in the ground form. Webb and Cmarik (1955) reported that a pelleted high concentrate ration produced greater gains, feed efficiency, and net returns when compared to the same ration fed to steers as meal.

DIGESTIBILITY, RUMINATION, AND PALATABILITY

Palatability in fattening rations is of fundamental importance. A dusty condition, which frequently exists when ground rations are fed, can

be eliminated by pelleting. Esplin et al. (1956) found when both pelleted and meal rations were available lambs consumed four times as much of the pelleted form over a two-week period. McCroskey et al. (1958) found that three steers and one heifer consumed 2.2 times more pellets when both a pelleted and a meal ration were made available.

A close correlation between coarseness of grind and rumination was found by Kick and Gerlaugh (1936). They reported that as hay was cut into finer pieces, less time was required by sheep in masticuation and rumination. Gordon (1958b) substantiates the above evidence by noting that sheep spent less time ruminating hay that was fed as a meal than hay which was fed as long or cut into two inch lengths. This difference in rumination time was highly significant.

Swanson and Herman (1952) prepared hay by chopping or grinding it into three states of fineness. Heifers ruminated normally when fed hay chopped to 1.5 to 3 inches in length, very infrequently when fed hay chopped to one inch in length, and never ruminated when fed hay ground through a 5/16 inch screen.

No difference in rumination time in sheep was reported by Gordon (1958) when hay was fed in three different ratios of roughage to concentrates; however, when no hay was fed, rumination time was reduced by one third. The value of this evidence is doubtful, however, because only one animal was involved.

Swanson and Herman (1952) presented evidence which indicates that the finer the hay is chopped for dairy heifers, the less digestible the crude fiber becomes. Long et al. (1955) observed that a ground mixed ration has

lower digestibility of the organic matter, crude fiber, crude protein, and nitrogen-free extract than when not ground; however, the digestibility of these nutrients in the pelleted ration was equal to the digestibility of the ration before it was ground.

Grinding and pelleting of dried grass as reported by Blaxter and MacGraham (1956) and alfalfa, Myer et al. (1959) resulted in no real difference in net energy value when fed to sheep. Myer et al. (1959) did find that the pelleted alfalfa was highest in nitrogen digestibility.

Murdock et al. (1951) reported from experiments with yearling sheep that, when compared to coarse ground dehydrated alfalfa, fine ground dehydrated alfalfa was lower in T.D.N. and digestibility of crude fiber. They also found that compared to ground dehydrated alfalfa, the pelleted dehydrated alfalfa was higher in digestibility of crude fiber and T.D.N. These differences were highly significant. Richardson et al. (1957) presented evidence from sheep digetion trials indicating nitrogen retention was greatest when the ration was pelleted.

Evidence given by Jensen et al. (1958) indicates that grinding and pelleting may be a predisposing cause of rumenal hyperparakeratosis in sheep. There was no difference in daily gain between the pellet-fed lambs and those fed the ground meal ration; however, the difference in the number of lambs affected with rumenal hyperparakeratosis was highly significant in one trial and significant in another. Within the pellet-fed lot of one trial, the daily gain of the unaffected lambs was significantly greater than the affected lambs.

Esplin and Story (1958) observed from lamb-fattening trials and

slaughter data that 10 percent of the lambs fattened on a pellet of equal parts of corn-cob-meal and alfalfa and 10 percent liquid protein supplement were affected with rumenal hyperparakeratosis. Also, 63.3 percent of the lambs fattened on a pellet of equal parts of milo and alfalfa were affected, 80 percent of those fattened on a pellet of equal parts of corn and alfalfa were affected, and 100 percent of those lambs fattened on a pellet of equal parts of corn and dehydrated alfalfa were affected with rumenal hyperparakeratosis.

DYNAFAC

Information on effects of dynafac in completely pelleted rations is almost nill; however, a limited amount of evidence in available indicating that dynafac has some merit in meal-fattening rations. Thomas (1957) observed that yearling steers fed a controlled amount of a high concentrate ration gained at a faster rate when they were implanted with 36 mg of stilbestrol at the outset of the trial and received dynafac in a 32 percent protein supplement. This group of steers gained 2.85 lbs. daily over a 112-day feeding period; this increase represented a 22 percent increase in gain over the control steers which received neither dynafac nor stilbestrol, 11 percent increase in gain over other steers which had stilbestrol only, and 17 percent increase in gain over steers which had dynafac only.

Zimmer and Embry (1958) self-fed a high concentrate, ground, meal ration and dynafac to steers implanted with 36 mg of stilbestrol and observed an increase in average daily gain of .31 lb. over steers which received no dynafac. Dynafac-fed steers also ate about four pounds more of the ration per day and had an average net return of $19.00 more per steer.

Thomas and Jordan (1957) observed only questionable value from feeding dynafac to steers in a dry-lot fattening trial. Feed efficiency was slightly improved in the dynafac lot; however, the daily gain was unaffected and the carcass grades and net returns were inferior to the controls.

STILBESTROL

The effectiveness of stilbestrol, either fed orally or subcutaneously implanted, in producing faster, cheaper gains in the feed lot is well accepted today. Clegg and Carroll (1957) reported that steers on feed for 193 days gained equally well when given stilbestrol in the form of 10 mg daily oral or a 15 mg implant at the outset of the trial. A highly significant difference existed, however, between either form of stilbestrol administration and no stilbestrol. The authors state that though USDA carcass grades were lowest in the untreated group; an inadequate number of steers were involved and probably a real difference did not exist.

Perry et al. (1958) gave evidence indicating that the 36 mg level of implantation was the most effective in producing rapid gains without sacrificing carcass grade over an extended feeding period. They observed that, at the end of the two-month period, the steers implanted with 24 mg were gaining as rapidly as any group; however, at the end of the third month, steers implanted with 36 mg or 48 mg were gaining more rapidly than those on any of the other treatments.

Clegg and Carrol (1957) summarized a large number of field trial involving a variety of fattening rations and lengths of feeding periods and concluded that cattle implanted with 15 mg of stilbestrol at the outset of the trial can be expected to gain 15 percent faster and have about 10 percent improve-

ment in feed efficiency. Implantation of from 30 to 60 mg of stilbestrol can be expected to increase the gain 25 percent and improve the feed efficiency 20 percent. However, the improvement in gain and feed efficiency above that expected from 15 mg implants can be expected at the expense of reduced carcass grade.

CUMULATIVE EFFECTS

Kercher and Hilston (1958) found that a ground, pelleted, high concentrate ration of 26 percent alfalfa and 74 percent concentrates improved the daily gain and feed efficiency, but reduced the net returns in steers when compared to a similar ration fed as loose grain and long alfalfa hay. Kercher and Hilston (1958b) observed that a ground, pelleted ration of equal parts of alfalfa and concentrates produced only a slight improvement in gain, but a substantial increase in net returns when compared to a similar ration fed as loose grain and long alfalfa hay to steers.

Foster et al. (1953) reported feeding a ground, pelleted, complete ration to heifers did not affect the daily gain, but improved the feed efficiency when compared to a non-pelleted ration. Baker et al. (1953) observed that heifers ate less and had improved feed efficiency when a ration of 25 percent alfalfa and 75 percent concentrates was ground and pelleted.

Pope et al. (1958) found that calves gained better and had higher feed efficiency and sale value when milo was ground and pelleted.

Noble et al. (1958) reported that feeding a finely ground and pelleted ration of 50 percent concentrates and 50 percent alfalfa increased the daily gain and feed consumption in lambs but decreased the feed efficiency when

compared to the non-pelleted ration.

Neale (1953) observed, over a three-year period, that lambs self-fed high roughage pelleted rations gained consistently faster on less feed than lambs hand-fed long alfalfa and whole sorghum grain. Compared to the long alfalfa used in the hand-fed ration, the alfalfa used in the pellet was described as coarse and of low quality.

Ittner et al. (1958) observed a significant improvement in daily gain in beef steers when the roughage component of a ration was ground through a 3/64 inch screen and compressed into a 13/64 inch pellet as compared to the feeding of whole roughage.

METHODS AND PROCEDURE

Forty yearling Hereford steers from a winter mineral feeding experiment were used for this fattening trial. Eight steers were assigned to each group on the basis of weight and previous experimental use and each group was assigned, at random, to one of five pens.

The percent composition of the pelleted and mixed grain rations fed in this trial is given in table I.

TABLE I. Percent composition of the rations fed in this trial.

Feed	Mixed grain and Hay	Pellet 1	Pellet 2
	%	%	%
Barley	58.25	40	40
Wheat mix	8.25	5	5
Beet pulp	27.25	20	20
Alfalfa	ad libitum	30	30
Sugar pulp	6.25	--	--
Molasses	------	5	5
Dynafac 1/	------	--	X

1/ Dynafac was added at a level of 200 grams per ton.

The pellets, made by First Feed Mills in Bozeman, were 3/8 of an inch in diameter and about 3/4 of an inch long. The mixed grain ration was formulated to equal, as closely as possible, the nutrient composition of the concentrate mixture used in the pellets. The five treatments are given

in table II.

TABLE II. Treatments used in this trial.

Group 1	Mixed grain and baled alfalfa hay
Group 2	Pellet number 1
Group 3	Pellet number 1 + straw
Group 4	Pellet number 2 + straw + dynafac
Group 5	Pellet number 2 + straw + dynafac + 36 mg stilbestrol implanted

Feeding was accomplished by large self-feeders which had an approximate capacity of two tons of pellets or one and one-half tons of mixed grain. These feeders, illustrated in figure 1, were 12 feet long, 3 1/2 feet wide, and 6 feet high. The height of the feeder at the throat of the calf was 22 inches and the feeder trough was about one foot square. They were recharged from the top where a door, hinged from the middle of the feeder, could be opened.

Only four of the self-feeders were completed at the beginning of the trial and these were placed in the four groups of steers which were to be fed the pelleted rations and the group 1 steers were fed in an open-type concentrate bunker for sixteen days or until the other self-feeder was completed.

Appetite of the steers and the physical appearance of the feces were used as a guide as to how rapidly the groups of steers could be advance to full feed. The steers were accustomed to eating five pounds of grain and a small amount of timothy hay daily when they were on the mineral trial.

Eleven days were taken to advance the steers in groups 2, 3, 4, and 5 to a full feed of pellets which was about sixteen pounds per day.

FIGURE 1. General view of self-feeders used in this trial.

Because of the inclement weather it was impractical to self-feed the steers in group 1 in an open-type concentrate bunker and, therefore, sixteen days were taken to advance these steers to full feed which was about sixteen pounds of grain and 2.5 lbs. of hay. It was assumed safe to fill the self-feeders when not all the feed was consumed, and the steers were contented and not scoured.

Recharging the self-feeders involved restricting each group of steers to their loafing sheds for one to several hours, thus taking them off feed.

This was considered an undesirable, but necessary practice, so each feeder was filled with about a two-weeks' supply each time.

Straw was fed to steers in group 2 while they were going on feed. As the full feed level was approached, straw was gradually left out of the diet until they were getting none at the end of the eleven day hand-fed period.

Open-type roughage bunkers with canvas tops were used to feed straw and hay. The pattern of feeding roughage was to weigh out a complete bale to each group of steers as needed. Each day a portion of the bale was fed to the respective groups of steers. The bunkers were frequently cleaned out and the rejected roughage weighed back after which it was used for bedding in the loafing shed.

Wheat straw was used for bedding in all loafing sheds except group 2. Because an objective of this experiment was to maintain the steers in group 2 on a roughage diet, limited to the amount received in the pellet, it was believed that wood shavings would be a more suitable bedding material. These shavings were obtained from Yellowstone Pine Lumber Mill in Belgrade, Montana, in bales which weighed about fifty pounds each.

Each pen of steers had access to a fresh water trough located in the lot. Double mineral boxes, which contained iodized salt in one part and a mixture of 50 percent dicalcium phosphate, 25 percent trace mineral salt, and 25 percent calcium carbonate, were constantly available in the loafing shed of each of the five lots.

The trial was initiated by restricting the groups of steers to their respective loafing sheds the night of May 21, 1958. They were individually

weighed onto the trial the morning of May 22, 1958, having been off feed and water for about sixteen hours, and started on their respective rations that evening. Thereafter, the steers were weighed individually every twenty-eight days. Feed consumption for each twenty-eight day period was calculated on the basis of the total amount of feed that had been added to each self-feeder minus the estimated amount which had not been eaten.

At the termination of the trial, the steers were restricted to their loafing sheds about 5 P.M. October 15, 1958, and were individually weighed at 7 A.M. October 16, 1958. The feed not eaten in each self-feeder was also weighed back at this time.

The steers were bought by Armour and Company and slaughtered in Spokane. They were loaded on trucks about 1 P.M. October 16, 1958, and transported to the Northern Pacific yards in Bozeman where they were loaded on rail cars at 6 P.M.

The steers left Bozeman at 1 A.M. October 17, 1958, and arrived in Spokane at 1 A.M. October 18, 1958. They were immediately switched down to Armour and Company's yards where they were unloaded and group-weighed by treatment. They were then assigned to pens and fed and watered.

Steers in groups 3, 4, and 5 were slaughtered on Monday, October 20, 1958, and steers in groups 1 and 2 were slaughtered on Tuesday, October 21, 1958. As the skinning of each animal was completed, the ear tags were removed and attached to each carcass. The identity was maintained for each set of viscera and a record made of condemned paunches and abscessed livers. After the digestive contents had been emptied from each paunch, the incidence of rumenal hyperparakeratosis was estimated.

The carcasses were weighed warm and twenty-four hours after slaughter and graded by a USDA grader forty-eight hours after slaughter.

The gains were analyzed by an analysis of variance by the Montana State College Statistics Laboratory.

RESULTS AND DISCUSSION

DAILY GAINS AND FEED LOT PERFORMANCE

The weights, feed consumption, and feed efficiency of the steers in this trial are summarized in table III.

TABLE III. Summary of weights, daily feed consumption, and feed efficiency by groups.

Group	1	2	3	4	5
Treatment	Mixed grain Alfalfa hay ad libitum	Ration pelleted	Straw ad libitum	Dynafac DES. 1/	
Number of steers	8	8	8	8	8
Average weight (lbs.)					
Initial	527	520	511	526	526
Final	899	875	905	934	969
Gain	372	355	394	408	443
Daily gain	2.53	2.41	2.68	2.78	3.01
Average daily ration					
Pelleted ration or Concentrate	17.6	18.6	19.6	21.4	22.2
Hay or Straw	2.36	---	.82	.82	.85
Feed/cwt. of gain (lbs.)					
Concentrate	693.9	769.9	733.5	770.0	737.6
Hay or Straw	93.1	----	30.5	29.5	28.3
Total	787.0	769.9	764.0	799.5	765.9

1/ Diethylstilbestrol 36 milligram implant.

Grinding and pelleting the ration of 70 percent concentrates and 30 percent alfalfa adversely affected the appetites of the steers in group 2 in comparison to the steers in group 1. These steers consumed 1.36 lbs. less total feed per day and gained .12 lb. less than the group 1 steers. Because