THE INFLUENCE OF THIOURACIL, PROPYLTHIOURACIL
AND THYROPROTEIN ON THE GROWTH AND
FATTENING OF LAMBS

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THE effectiveness of thiouracil and related compounds in inhibiting the action of the thyroid gland has been established in the human and in many other species. The possible use of these compounds to alter the growth rate, fattening efficiency and market quality of animals because of thyroid alteration has been investigated with several species. Much of the early work with these materials was done with the rat. The administration of thiouracil to growing rats has been shown to retard growth by numerous workers: Hughes 1944; Gordon, Goldsmith and Charipper (1946), and Williams, Weinglass, Bissell and Peters (1944).

Astwood, Bissell and Hughes (1944) reported that 0.5 percent thiouracil in the ration of young chicks greatly retarded growth and development although 0.1 percent thiouracil in the ration did not impair growth. Kempster and Turner (1945) reported that thiouracil fed to ten week old New Hampshire broilers for a 16 day period did not retard growth. However, when the same level of thiouracil was fed for 36 days, growth rate was depressed and feed requirements per pound of gain were increased but market quality was improved. Andrews and Schnetzler (1946) reported that growth of Barred Plymouth Rock Chickens was retarded when thiouracil was added to a standard broiler ration at levels of 0.025, 0.05, 0.10 and 0.20 percent of the ration fed between the 6th and 14th weeks. Market grade and fat deposition were significantly improved by thiouracil and the efficiency of feed utilization was greater when adjusted for gain. Glazner and Jull (1946) reported that thiouracil at 0.1 and 0.2 percent levels inhibited growth and feed consumption of chicks throughout a ten week period.

Beeson, Andrews and Brown (1947) fed thiouracil to yearling Hereford steers at the rate of 2.0 gm., 4.0 gm. and 6.0 gm. per steer daily and reported that the rate of gain appeared to be slightly increased in the groups receiving 2.0 and 4.0 gm. of thiouracil per day. Dressing percentage and degree of finish were not significantly affected by thiouracil but there was a tendency for improvement of both of these characteristics.

Muhrer and Hogan (1945) pair fed four groups of swine and limited the feed intake of the control animals to that of the pigs which received the same

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ration plus thiouracil. The animals which received thiouracil gained more rapidly than did the controls but the controls would have consumed more food on ad libitum feeding. The growth rate of both the thiouracil and control groups was less than is usually expected in normal swine. McMillen, Reineke, Bratzler, and Francis (1947) reported that barrows fed a ration containing 0.1 percent thiouracil for 31 days made slightly less daily gain but required less feed per unit of gain. Vander Noot, Reece and Skelley (1947) reported that hogs fed a ration containing 0.25 percent thiouracil consumed 27.5 percent less feed per 100-pounds of gain than did hogs fed the same ration containing no thiouracil. The thiouracil fed hogs also gained more rapidly.

Feeding thiouracil at a level of 0.1 percent of the diet to pigs averaging 53 pounds markedly retarded growth, reduced feed intake and caused the pigs to become very short and chuffy, sluggish and to develop severe myxedema (Beeson, Andrews, Witz and Perry, 1947). Muhrer, Warmer, Palmer and Hogan (1947) reported that in a 28 day feeding period pigs receiving 0.1 percent thiouracil required 24.4 percent less feed per unit of gain than did controls. However, the thiouracil fed pigs contained about 3 percent more water and 3 percent less fat than did the controls.

Willman, Loosli and Klosterman (1946) reported that 124 pound hogs fed a basal ration containing 0.1 percent thiouracil gained only about one half as fast as similar animals fed the basal ration without thiouracil. Pigs fed a ration containing 0.2 percent thiouracil failed to gain and the thiouracil had to be discontinued.

Growth rate of 150 pound swine was seriously depressed by 0.25 percent thiouracil in the ration for a 51 day period in an experiment reported by Acevedo, Schweigert, Pearson and Dahlberg (1948). The feed intake and feed efficiency was also lower for the animals fed thiouracil.

In a previous investigation at this station (Andrews, Beeson, Barrick and Harper 1947), thiouracil fed to lambs at the rate of 0.18 gm. 0.33 gm. and 0.34 gm. per lamb per day had no significant effect on total gain in weight, although rate of gain was slightly less in all lots receiving thiouracil. When thiouracil was fed at the rate of 1.15 gm. per lamb daily, feed consumption was reduced and the gain was significantly decreased. There were no differences in total feed consumption per pound of gain with thiouracil intakes of 0.18 gm. and 0.33 gm. per lamb daily but there was a tendency for the amount of feed required per pound of gain to increase as the level of thiouracil increased. Carcass quality was improved in the lots receiving 0.18 gm. and 0.33 gm. of thiouracil. The thyroid glands from lambs receiving thiouracil at all levels were significantly heavier than those of the control animals, and showed the microscopic changes which are generally attributable to thiouracil.
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This report covers two additional feeding experiments with lambs to study the effects of thiouracil, propylthiouracil and thyroprotein on growth rate, efficiency of feed utilization and market quality.

Experimental

Two winter feeding experiments were conducted. Texas feeder lambs were used during the winter of 1946–47 and Northwest feeder lambs during the winter of 1947–48. Rambouillet breeding predominated in the lambs used both years. The starting and finishing weights were approximately 70 and 100 pounds respectively. The animals were allotted on the basis of size, type and sex into 16 lots. They were weighed individually at the beginning and close of the experiments and at three week intervals during the experiments. At the time of slaughter the dressed weights and carcass grades were obtained. The thyroids were removed at random from \( \frac{1}{2} \) or more of the lambs on each treatment, gross thyroid weights were obtained and tissues were prepared for microscopic examination.

In the 1946–47 experiment (experiment II) thiouracil and propylthiouracil were used. Data on the effectiveness of propylthiouracil with humans and with rats indicated it was about 10 times as potent as thiouracil. The dosage for lambs was calculated on this basis. Since the 1945–46 experiment showed that 0.18 gm. and 0.33 gm. of thiouracil per lamb daily were effective in inhibiting the action of the thyroid gland without limiting feed consumption and rate of gain, these levels were used as a guide. The treatments consisted of the following: I, Control; II, 0.21 gm. of thiouracil; III, 0.39 gm. of thiouracil; and IV, 0.03 gm. of propylthiouracil per lamb daily. Four lots of 10 lambs each received each treatment. The basal ration fed to all lots consisted of the following: a pelleted concentrate containing 86.5 percent ground No. 2 yellow corn, 12.5 percent expeller process soybean oil meal, and 1 percent plain salt; mixed hay consisting of approximately 50 percent red clover and 50 percent mixed grasses; and loose plain salt. The drugs were incorporated in the pellets.

Some difficulty was experienced in the 1946–47 experiment in getting what was considered a desirable concentrate intake. This was reflected in the rate of gain. At the end of 60 days an attempt was made to increase the grain consumption by limiting the roughage intake. The roughage was gradually reduced from approximately 2 pounds per head per day to 1.4 pounds per day and an attempt made to gradually increase the grain to obtain an average intake of 1.5 pounds per head daily. Between March 6 and March 24, starting one week after reducing the hay intake, eleven lambs died. Enterotoxemia was given as the probable cause of death on post mortem examina-

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2 The authors express their appreciation to Dr. K. K. Chen and the Lilly Research Laboratories for the thiouracil and propylthiouracil.
tion. The losses were quite generally distributed among the different treatments.

In the 1947-48 experiment (experiment III) thiouracil was again used with the intake increased somewhat for one treatment over that used in experiment II. Two levels of thyroprotein were used on limited numbers of animals. The treatments were as follows: I, Control; II 0.42 gm. of thiouracil; III, 0.63 gm. of thiouracil; IV 0.52 gm. of thyroprotein and V, 1.04 gm. of thyroprotein per lamb daily. Sixteen lots of 12 lambs each were used. In treatments I, II and III four lots were used for each treatment and two lots received each of treatments IV and V.

The concentrate and method of incorporating the drugs were the same as in the previous experiment except that the soybean meal was omitted from the pellets the last 60 days of the feeding trial as the rations were too laxative when the lambs were approaching full feed.

In addition to the different drug treatments, the experiment was designed to compare the effects of alfalfa vs. clover hay and iodized vs. plain salt in the different treatments. One half of the lambs on each treatment received alfalfa hay and one half received red clover hay. One half the lambs on each treatment and one half of those receiving each kind of hay received iodized salt and the other half received plain salt.

Since it was desirable to know something of the relation of time to the effects of the treatments on the thyroid glands, some animals were slaughtered at three different periods during the experiment. One lamb from each of the sixteen lots was slaughtered at the completion of 42 days on experiment, five from each lot were slaughtered at the completion of 84 days and the remainder were slaughtered at 126 days. Carcass data was obtained on all the animals except those slaughtered at 42 days.

**Results and Discussion**

*Experiment II, Winter 1946-47*

It required 115 days for the lambs in this experiment to reach a desirable market weight. The data on weight gains, feed consumption and feed efficiency are summarized in table 1. The gains were not noticeably affected by 0.21 gm. of thiouracil or 0.03 gm. of propylthiouracil per lamb daily while the gain for the lambs receiving 0.39 gm. of thiouracil was only slightly depressed. The differences in gain were not large enough nor uniform enough for the four replications to be significant. It will also be noted from table 1 that the average daily concentrate consumption was less for the lambs getting the high level of thiouracil than for the other treatments. It was not possible

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3 The authors express their appreciation to Dr. W. R. Graham and the Cerophyl Laboratories for the thyroprotein used.
to maintain consumption of the concentrate at as high a level for these lambs as for the other treatments. This was believed to be due to the lowered palatability of the pellets with the larger amount of thiouracil. The data on feed efficiency show approximately the same amount of feed required per pound of gain for all treatments except the one providing 0.39 gm. of thiouracil which was only slightly less efficient.

The carcass yields and carcass grades were not significantly affected by the different treatments as shown by the data in table 2. This is in contrast to the experiment previously reported (Andrews et al. 1947) which showed an improvement in carcass quality in lambs treated with 0.18 and 0.33 gm. of thiouracil per lamb daily.
The thyroids from the lambs treated with thiouracil in this experiment were not enlarged and failed to show the microscopic evidences of stimulation observed in the previous experiment. Data on the gross thyroid weights and thyroid histology are being presented in another paper.

**Experiment III. Winter 1947-48**

The length of the feeding period was not the same for all the animals in this experiment as the animals were slaughtered at three different periods during the progress of the experiment to observe possible progressive changes in the thyroid gland. One animal from each lot (4 animals from each of treatments I, II, III and 2 animals from each of treatments IV and V) were on experiment 42 days, five animals from each lot were on experiment 84 days and the remainder or six animals from each lot were on experiment 126 days. There were some exceptions to this as a result of death losses. A total of 6 animals died of enterotoxemia. One ewe lamb in the experiment lambed during the latter part of the feeding period and was removed from the experiment.

In this trial, as in the previous one, thiouracil did not significantly affect the rate or efficiency of gain (table 3). The animals receiving 0.63 gm. of thiouracil per lamb daily tended to consume less concentrate than the animals on the other treatments. The animals getting 0.42 gm. of thiouracil daily consumed about the same amount of concentrate as the controls when they were on full feed.
The consumption of concentrate was stimulated slightly in the lots receiving thyroprotein. However, when these lambs reached a point where they were consuming all the concentrate they would clean up in a reasonable time some difficulty was experienced with them dropping off on their feed for a few days.

**Table 3. Effect of ThioUracil and Thyroprotein on the Growth Rate, Feed Consumption and Feed Efficiency of Lambs.**

<table>
<thead>
<tr>
<th>Treatment No. and ration</th>
<th>I, Basal</th>
<th>II, Basal +0.42 gm. thiouracil daily</th>
<th>III, Basal +0.63 gm. thiouracil daily</th>
<th>IV, Basal +0.52 gm. thyroprotein daily</th>
<th>V, Basal +1.04 gm. thyroprotein daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of lambs</td>
<td>46</td>
<td>48</td>
<td>44</td>
<td>23</td>
<td>24</td>
</tr>
</tbody>
</table>

**Growth Rate**

<table>
<thead>
<tr>
<th></th>
<th>Basal</th>
<th>+0.42 gm. thiouracil daily</th>
<th>+0.63 gm. thiouracil daily</th>
<th>+0.52 gm. thyroprotein daily</th>
<th>+1.04 gm. thyroprotein daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. initial wt., lb.</td>
<td>75.48</td>
<td>75.38</td>
<td>75.75</td>
<td>75.09</td>
<td>75.42</td>
</tr>
<tr>
<td>Av. final wt., lb.</td>
<td>105.33</td>
<td>104.19</td>
<td>104.27</td>
<td>105.65</td>
<td>104.67</td>
</tr>
<tr>
<td>Gain per lamb, lb.</td>
<td>29.85</td>
<td>28.81</td>
<td>28.52</td>
<td>30.16</td>
<td>20.25</td>
</tr>
<tr>
<td>Daily gain per lamb, lb.*</td>
<td>0.29</td>
<td>0.38</td>
<td>0.28</td>
<td>0.30</td>
<td>0.29</td>
</tr>
</tbody>
</table>

**Daily Feed Consumption**

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Pellets, lb.</td>
<td>1.40</td>
<td>1.38</td>
<td>1.30</td>
<td>1.44</td>
<td>1.44</td>
<td>3.037</td>
</tr>
<tr>
<td>Legume hay, lb.</td>
<td>1.61</td>
<td>1.57</td>
<td>1.59</td>
<td>1.54</td>
<td>1.59</td>
<td>3.347</td>
</tr>
<tr>
<td>Salt, lb.</td>
<td>0.023</td>
<td>0.023</td>
<td>0.025</td>
<td>0.014</td>
<td>0.019</td>
<td>0.268</td>
</tr>
<tr>
<td>Thiouracil, gm.</td>
<td>--</td>
<td>0.22</td>
<td>0.73</td>
<td>--</td>
<td>--</td>
<td>0.955</td>
</tr>
<tr>
<td>Thyroprotein, gm.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.521</td>
<td>1.043</td>
<td>--</td>
</tr>
<tr>
<td>Total, lb.</td>
<td>3.032</td>
<td>2.973</td>
<td>2.915</td>
<td>3.994</td>
<td>3.049</td>
<td>10.945</td>
</tr>
</tbody>
</table>

**Feed per Pound Gain**

<table>
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</thead>
<tbody>
<tr>
<td>Pellets, lb.</td>
<td>4.79</td>
<td>4.85</td>
<td>4.62</td>
<td>10.376</td>
</tr>
<tr>
<td>Legume hay, lb.</td>
<td>5.51</td>
<td>5.54</td>
<td>5.64</td>
<td>10.756</td>
</tr>
<tr>
<td>Salt, lb.</td>
<td>0.076</td>
<td>0.081</td>
<td>0.089</td>
<td>0.246</td>
</tr>
<tr>
<td>Total, lb.</td>
<td>10.356</td>
<td>10.471</td>
<td>10.349</td>
<td>30.176</td>
</tr>
</tbody>
</table>

* Differences not statistically significant.

The lambs receiving 0.52 gm. and 1.04 gm. of thyroprotein daily made approximately the same total gain as the control lambs. There were no significant differences in feed efficiency for any of the treatments. It will be noted in table 3 that free choice salt consumption was less for the thyroprotein treated lambs than for the controls and thiouracil treated lambs.

The lambs receiving alfalfa hay made an average gain for the feeding period of 28.70 pounds in comparison with 29.86 pounds for those receiving clover hay. The feed consumption was also slightly higher on the clover fed lambs and less difficulty was experienced with them going off feed.
The lambs receiving plain salt made an average gain for the feeding period of 29.61 pounds and those receiving iodized salt gained 28.95 pounds.

The carcass yields and percent of carcasses in each grade are shown in table 4. There were no marked differences in either the yields or carcass quality of the different groups. The control lambs had a few more choice carcasses. The official grader stated that this was due more to conformation than to finish. Very few of the carcasses were of suitable conformation to receive a choice grade.

As in Experiment II the gross thyroid weights and thyroid histology did not show evidences of thiouracil administration. This was true for the three different periods at which the thyroids were examined. The thyroids of the thyroprotein fed lambs were distinctly different than the other groups. The follicular epithelial cells were of the very low cuboidal type and the glands appeared to be in a resting state.

Discussion

Thiouracil at levels of 0.21 gm., 0.39 gm., 0.42 gm. and 0.63 gm. per lamb daily (0.014 to 0.048 percent of the rations) did not significantly affect growth rate, feed efficiency, carcass yield or carcass quality. The thyroid glands of the thiouracil or propylthiouracil treated animals failed to show marked evidences of stimulation. This is in contrast to the work previously reported (Andrews et al., 1947) in which thiouracil levels of 0.18 gm. and 0.33 gm. per lamb daily caused marked changes in the thyroid gland and some increase in fat deposition as indicated by the carcass grades.
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Thiouracil tended to reduce consumption of the feed with which it was incorporated. An average of 0.33 gm. of thiouracil per pound of concentrate for the 1946-47 feeding period resulted in slightly decreased consumption of the pelleted concentrate. In the 1947-48 experiment concentrate consumption was depressed by an average of 0.48 gm. of thiouracil per pound of feed.

Depression of feed consumption with the sheep in these experiments were believed to be due to lessened palatability and is in agreement with data reported for other species: Leathern (1945), and (1946) with rats; Glazner and Jull (1946) with chickens; Muhrer and Hogan (1945); Beeson, Andrews, Witz and Perry (1947); and Acevedo, Schweigert, Pearson and Dahlberg (1948) with swine.

Investigations reported with most species show that thiouracil and related substances retard growth rate. However, Muhrer and Hogan (1945) using paired feeding and Vander Noot, Reece and Skelley (1947) with group feeding of swine reported that thiouracil increased the rate of gain of hogs. The growth rate of the control swine in the latter mentioned experiment was definitely subnormal.

The extent of growth retardation is related to age of the animals during treatment, the level of drug administration and length of time it is administered. Williams, Weinglass, Bissell and Peters (1944) reported that thiouracil fed to rats in relatively large amounts (0.25 percent solution in the form of salt in the drinking water) for intervals of from 5 to 90 days caused a distinct retardation in growth, the effect becoming apparent within 10 days. Astwood, Bissell and Hughes (1944) found that 0.1 percent thiouracil fed in the ration of chicks for 10 weeks beginning within a few days after hatching did not impair growth although thyroid weight was greatly increased. When the level of thiouracil was raised to 0.5 percent growth and development were greatly retarded. Kempster and Turner (1945) fed a ration containing 0.2 percent thiouracil to ten week old New Hampshire chicks for a 16 day period and found that growth was not reduced. When thiouracil was fed at the same level for 36 days, growth rate was depressed and feed requirements per pound of gain were increased. Andrews and Schnetzler (1946) reported that growth of Barred Plymouth Rock chickens was retarded when thiouracil was added to a standard broiler ration at levels of 0.025, 0.05, 0.10 and 0.20 percent of the ration fed between the 6th and 14th weeks.

The initial investigation with lambs at this station (Andrews et al., 1947) showed that growth rate was not significantly retarded by thiouracil intakes of 0.012 to 0.037 per cent of the ration but was significantly retarded by a thiouracil intake of 0.08 percent of the ration for a period of 84 days. The levels of thiouracil reported in this paper (0.014 to 0.048 percent of the ration)
were not high enough to retard growth rate. Growth retardation as a result of restricting the normal secretion of the thyroid gland is closely associated with age in most species, more depression of growth being shown with very young animals than with partially grown animals.

Increased feed efficiency of animals fed thiouracil, as measured by the pounds of feed required per pound increases in weight, has been reported with hogs by Muhrer and Hogan (1945); Vander Noot, Reece and Skelley (1947); McMillen, Reineke, Bratzler and Francis (1947) and Muhrer, Warner, Palmer and Hogan (1947). On the other hand, Willman, Loosli and Klosterman (1946), Beeson, Andrews, Witz and Perry (1947) and Acevedo, Schweigert, Pearson and Dahlberg reported decreased feed efficiency of hogs fed thiouracil.

Glazener and Jull (1946) reported decreased feed efficiency as a result of feeding 0.1 and 0.2 percent thiouracil to chicks while Andrews and Schnetzler (1946) found there was no significant difference in the pounds of feed required per pound of gain for chickens receiving 0.05 or 0.10 percent thiouracil and control birds.

The true feed efficiency is not accurately expressed by comparing the pounds of feed required per pound of gain by thiouracil treated and control animals. The retardation of bone and muscle growth and decreased metabolic rate produced in some species by the administration of thiouracil may result in a larger portion of the energy intake being converted into fat. Since the fattening process represents a concentration of energy, the total caloric value of the tissues responsible for the weight increase would give a more accurate picture of feed efficiency. Andrews and Bohren (1947) reported that when the average gain per 100 gm. of feed was calculated and composition of the gain disregarded there was no significant difference in the feed efficiency of cockerels fed 0.2 per cent thiouracil and control birds. However, when caloric composition of the gains was used as a basis, the birds which received thiouracil were approximately 70 percent more efficient in the conversion of feed energy to edible energy than the controls.

Market grades of the carcasses of meat animals are an indication of the amount of finish or fat on the carcass. Kempster and Turner (1945), Andrews and Schnetzler (1946) and Andrews and Bohren (1947) reported improved market grades in chickens fed thiouracil. Improved market grades were reported in lambs fed 0.18 and 0.33 gms. of thiouracil per lamb daily (Andrews et al., 1947).

Muhrer, Warner, Palmer and Hogan (1947) reported that carcasses of thiouracil fed pigs actually contained 3 percent less fat and 3 percent more water than did controls even though the appearance of the live animals indi-
Thiouracil fed pigs contained the larger percentage of fat. Thiouracil fed lambs in the experiments reported here failed to show any improvement in carcass grade over the control animals. The carcass quality of beef steers was not improved by thiouracil treatment (Beeson, Andrews and Brown, 1947).

The levels of thiouracil administered in these experiments did not cause significant differences in rate of gain, feed efficiency, carcass yield or carcass quality. The thyroid glands of the animals failed to show the marked evidence of stimulation obtained in a previous experiment with similar levels of thiouracil. It must be concluded that there is a marked variation in the response of sheep to thiouracil.

Several explanations for the differences have been considered. It is possible though not probable, that the thiouracil used in the first experiment (Andrews et al., 1947) was more goitrogenic than that subsequently used. It is likewise possible that the condition of the thyroid glands of the sheep used in the different years was dissimilar during the pre-experimental period. If the iodine intake of the lambs was different during gestation and the postnatal period it is possible that this might affect their subsequent response to goitrogens. There were no histological evidences of iodine deficiency in the control lambs of the first experiment at the time of slaughter but six sheep which were retained and killed four months later showed some evidence of thyroid hypertrophy. The use of plain and iodized salt in the 1947-48 experiments produced no differences in response to thiouracil treatment. Age, breeding and environmental conditions have been considered in an attempt to explain the differences obtained but no satisfactory explanation has been forthcoming.

Samples of the thiouracil used in experiment II were checked chemically by manufacturer and were reported to have the original potency.

It appears that the levels of thiouracil and propylthiouracil used in the experiments reported here were not high enough to inhibit the action of the thyroid gland. Since the higher levels used tended to limit feed consumption, it is likely that feed containing sufficient thiouracil to inhibit the thyroid gland would be very unpalatable and would not be consumed in sufficient amounts for normal gains.

From the large number of drugs now available which tend to inhibit the action of the thyroid gland it might be possible to select a compound which is effective in sheep without lowering the palatability of the feed. Propylthiouracil at the low levels used in these experiments was not effective and it also imparts a bitter taste to the feed.

The fact that thyroprotein at the two different levels used did not affect
the rate or efficiency of gain of lambs as compared to thiouracil treated and control lambs indicates that the thyroid hormone does not have a marked effect on the growth of sheep at the age and stage of maturity of these feeder lambs.

Summary and Conclusions

Thiouracil administered in the feed at the rate of 0.21 gm. and 0.39 gm. per lamb daily for the fattening period during the winter of 1946-47 and at the rate of 0.42 and 0.63 gm. per lamb daily during the winter of 1947-48 had no significant effect on total gain, feed efficiency, carcass yield or carcass grade.

Propylthiouracil administered in the feed at the rate of 0.03 gm. per lamb daily for the fattening period during the winter of 1946-47 had no significant effect on total gain, feed efficiency, carcass yield or carcass quality.

Thyroprotein administered in the feed at the rate of 0.52 and 1.04 gm. per lamb daily for the fattening period during the winter of 1947-48 had no significant effect on total gain, feed efficiency, carcass yield or carcass grade.

Feed consumption was somewhat reduced by thiouracil intakes of 0.39 to 0.63 gm. per lamb per day in the feed and was somewhat stimulated by 0.52 gm. and 1.04 gm. of thyroprotein per day in the feed.

Thyroid glands of lambs fed 0.21 to 0.63 gm. of thiouracil per day, and 0.03 gm of propylthiouracil per day showed no more evidence of stimulation than those from control animals and were not increased in size.

Thyroid glands from the lambs fed 0.52 and 1.04 gm. of thyroprotein examined histologically were found to be in a resting state.

Results of these experiments did not indicate any advantage in using thiouracil or thyroprotein in the ration for fattening western feeder lambs.

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