

Project 111GC—Lamb Feeding Investigations

Department of Animal Husbandry and Garden City Branch
Agricultural Experiment Station Cooperating.
1948 - 49

EXPERIMENTS WITH SODIUM BICARBONATE FOR THE
CONTROL OF FEED LOT DEATH LOSSES.
SORGHUM GRAIN AND ROUGHAGE COMBINATIONS FOR
FATTENING LAMBS

R. F. Cox and A. B. Erhart

Experiments in the use of bicarbonate of soda for the control of death losses in the feedlot were begun last year. Two small scale tests indicated that it was highly beneficial. In this years experiments, four lots of lambs were used to give further tests of the value of sodium bicarbonate in the feed and in the water.

Comparisons were also made of Westland milo grain, Axtell grain, immature Westland grain and a combination of Westland grain and beet molasses.

Roughage tests included comparisons of Axtell roughage, alfalfa hay and alfalfa straw.

Lambs:

The lambs in this years experiments were good quality, smooth finewool-type lambs from northern New Mexico. They weighed sixty pounds per head into the experiment.

Feed Prices:

| | |
|--------------------------------------|------------------|
| Westland Milo and Axtell Grain | \$ 2.00 per cwt. |
| Beet Molasses | 38.00 per ton |
| Cottonseed Cake | 90.00 per ton |
| Axtell Roughage | 7.50 per ton |
| Alfalfa Hay | 20.00 per ton |
| Alfalfa Straw .. | 10.00 per ton |
| Sodium Bicarbonate | 3.55 per cwt. |
| Ground Limestone | .70 per cwt. |
| Salt | .85 per cwt. |

Death Loss:

Twenty-one lambs died out of a total of 525, a loss of 4%. Sixteen of these died from urinary calculi, one from enteritis, one from exposure following burial under snow and three from undetermined causes.

Garden City Branch
Kansas Agricultural Experiment Station
Garden City, Kansas
GRAIN AND ROUGHAGE COMPARISONS
Rufus F. Cox, A. B. Erhart

Table—November 20, 1948 to March 17, 1949—117 days

| 1—Lot Number | 1 | | 6 | | 7 | | 8 | | 9 | | 10 | |
|--------------------------------|---------------|---------------------|------------------------------|-----------------|--------------|-------------------|--------------------------------|---------------------|---------------|---------------------|------------------|--------------|
| | Westland Milo | Westland C. S. Cake | Immature Westland C. S. Cake | Axtell Roughage | Axtell Grain | Axtell C. S. Cake | Westland & Molasses C. S. Cake | Westland C. S. Cake | Westland Milo | Westland C. S. Cake | Westland Alfalfa | Westland Hay |
| 2—Ration fed | | | | | | | | | | | | |
| 3—Number of lambs per lot..... | 48 | 50 | 50 | 50 | 50 | 50 | 48 | 48 | 49 | 50 | 50 | 50 |
| 4—Number of days on feed..... | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 117 |
| 5—Initial weight per lamb..... | 60.70 | 60.76 | 60.76 | 60.48 | 60.48 | 60.48 | 60.44 | 60.44 | 60.52 | 60.52 | 60.68 | 60.68 |
| 6—Final weight per lamb | 91.97 | 97.32 | 97.32 | 96.00 | 96.00 | 96.00 | 94.13 | 94.13 | 105.92 | 105.92 | 106.58 | 106.58 |
| 7—Total gain per lamb..... | 31.27 | 36.56 | 36.56 | 35.52 | 35.52 | 35.52 | 33.69 | 33.69 | 45.40 | 45.40 | 45.90 | 45.90 |
| 8—Daily gain per lamb..... | .27 | .31 | .31 | .30 | .30 | .30 | .29 | .29 | .39 | .39 | .39 | .39 |

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| | 1.11 | 1.14 | 1.09 | .87 | 1.16 | 1.16 | 1.16 |
|--|---------|---------|---------|---------|---------|---------|---------|
| 9—Feed per lamb daily: | | | | | | | |
| Grain | 1.11 | 1.14 | 1.09 | .87 | 1.16 | 1.16 | 1.16 |
| Molasses | | | | .24 | | | .25 |
| Cotton Seed Cake0..... | .24 | .24 | .24 | .24 | .25 | .25 | .25 |
| Roughage | 2.07 | 2.04 | 2.06 | 2.10 | 1.93 | 1.93 | 2.20 |
| Limestone | oz. .25 | oz. .25 | oz. .25 | oz. .25 | | | |
| 10—Feed per cwt. of gain: | | | | | | | |
| Grain | 413.53 | 363.92 | 362.08 | 300.59 | 299.45 | 299.45 | 296.19 |
| Molasses | | | | 82.64 | | | |
| Cotton Seed Cake | 90.57 | 77.46 | 79.73 | 84.06 | 63.04 | 63.04 | 62.35 |
| Roughage | 774.86 | 652.35 | 678.89 | 729.47 | 497.14 | 497.14 | 559.91 |
| Limestone | 5.53 | 4.76 | 4.87 | 5.14 | | | |
| 11—Feed cost per cwt. gain | \$15.33 | \$13.28 | \$13.44 | \$14.17 | \$11.32 | \$11.32 | \$14.33 |
| 12—Initial cost per lamb into feedlot... | \$17.98 | \$17.98 | \$17.98 | \$17.98 | \$17.98 | \$17.98 | \$17.98 |
| 13—Feed cost per lamb..... | \$ 4.79 | \$ 4.85 | \$ 4.77 | \$ 4.77 | \$ 5.14 | \$ 5.14 | \$ 6.58 |
| 14—Lamb cost plus feed cost | \$22.77 | \$22.83 | \$22.75 | \$22.75 | \$23.12 | \$23.12 | \$24.56 |
| 15—Final cost per cwt..... | \$24.76 | \$23.46 | \$23.70 | \$24.17 | \$21.83 | \$21.83 | \$23.04 |

Garden City Branch Agri. Expt. Station—Garden City, Kansas
BICARBONATE OF SODA TESTS
 Rufus F. Cox, A. B. Erhart

Table—November 20, 1948 to March 17, 1949—117 Days

| 1—lot Number | 1 | 2 | 3 | 4 | 5 |
|---|----------------------------------|----------------------------------|----------------------------------|---------------------------------------|----------------------------------|
| | West-land Milo C. S. Cake Axtell | West-land Milo C. S. Cake Axtell | West-land Milo C. S. Cake Axtell | West-land Milo C. S. Cake Axtell | West-land Milo C. S. Cake Axtell |
| 2—Ration fed | Rough-age Gr. Limestone | Rough-age Gr. Limestone | Rough-age Gr. Limestone Soda | Rough-age Gr. Limestone Soda in Water | Rough-age Gr. Limestone Soda |
| 3—Number lambs per lot... | 48 | 44 | 41 | 40 | 44 |
| 4—Number of days on feed | 117 | 117 | 117 | 117 | 117 |
| 5—Initial weight per lamb... | 60.70 | 60.56 | 60.50 | 60.64 | 60.50 |
| 6—Final weight per lamb... | 91.97 | 99.43 | 95.73 | 96.38 | 92.25 |
| 7—Total gain per lamb..... | 31.27 | 38.87 | 35.23 | 35.74 | 31.75 |
| 8—Daily gain per lamb..... | .27 | .33 | .30 | .31 | .27 |
| 9—Feed per lamb daily: | | | | | |
| Grain | 1.11 | 1.47 | 1.37 | 1.39 | 1.41 |
| Cotton Seed Cake | .24 | .24 | .24 | .24 | .24 |
| Roughage | 2.07 | 1.24 | 1.25 | 1.25 | 1.18 |
| Limestone | oz. .25 | oz. .25 | oz. .25 | oz. .25 | oz. .25 |
| Soda | | | oz. .21 | oz. .22 | oz. .21 |
| 10—Feed per cwt. of gain: | | | | | |
| Grain | 413.53 | 443.58 | 456.14 | 456.63 | 518.74 |
| Cotton Seed Cake | 90.57 | 72.86 | 80.39 | 79.24 | 89.19 |
| Roughage | 774.86 | 374.43 | 413.51 | 409.29 | 433.32 |
| Limestone | 5.53 | 4.45 | 4.91 | 4.84 | 5.45 |
| Soda | | | 4.40 | 4.42 | 4.88 |
| 11—Feed cost per cwt. gain... | \$15.33 | \$13.60 | \$14.50 | \$14.45 | \$16.24 |
| 12—Initial cost per lamb into feedlot | \$17.98 | \$17.98 | \$17.98 | \$17.98 | \$17.98 |
| 13—Feed cost per lamb..... | \$ 4.79 | \$ 5.27 | \$ 5.10 | \$ 5.16 | \$ 5.15 |
| 14—Lamb cost plus feed cost... | \$22.77 | \$23.26 | \$23.08 | \$23.14 | \$23.13 |
| 15—Final cost per cwt. | \$24.76 | \$23.39 | \$24.11 | \$24.01 | \$25.07 |

SUMMARY

Table I

- Both immature Westland milo grain and Axtell grain produced larger and more economical gains than mature Westland milo in these tests. Compare lots 1, 6 and 7 and see chemical analysis in table below.
- Beet molasses fed as approximately 20 percent of the concentrate allowance increased the rate and efficiency of gains on fattening lambs. This confirms results of several previous tests. Compare lots 1 and 8.

3. Alfalfa straw and alfalfa hay both proved much superior to Axtell roughage in the efficiency and rate of gains produced. See lots 1, 9 and 10.
4. Axtell roughage had approximately 70 percent the value of alfalfa hay or alfalfa straw in these tests, agreeing closely with tests of last year.

CHEMICAL ANALYSIS OF FEEDS USED

| FEED | Protein | Ether Extract | Crude Fiber | Mois- ture | Ash | Nit.-Free Extract |
|---------------------------|---------|------------------|----------------|---------------|------|----------------------|
| Axtell Grain | 11.38 | 3.95 | 1.61 | 10.09 | 1.59 | 71.38 |
| Westland Milo | 8.81 | 3.29 | 1.73 | 11.00 | 1.64 | 73.56 |
| Immature Westland Milo... | 10.69 | 2.75 | 2.56 | 10.45 | 1.74 | 71.81 |
| Axtell Roughage | 3.06 | 1.34 | 22.97 | 7.36 | 9.85 | 55.42 |
| Alfalfa Straw | 11.25 | 1.30 | 41.27 | 7.18 | 6.57 | 32.43 |
| Alfalfa Hay | 13.56 | 1.27 | 36.96 | 8.10 | 9.42 | 30.69 |

Table II

5. Feeding of highly concentrated rations reaching 2.4 pounds of corn per lamb daily at intervals, in this year's experiments failed to produce enterotoxemia or any other form of serious digestive disturbance. Because of this, the tests of the value of bicarbonate of soda for reducing digestive disorders were inconclusive.
6. There was evidence that soda feeding resulted in decreasing total feed consumption and gains in this year's tests. This is directly opposed to last year's results and indicates the need for more experimental work on this subject.
7. No difference in response was noted where soda was fed to lambs mixed dry with the feed compared with supplying it in the drinking water.
8. Moderately heavy losses from urinary calculi resulted in the experimental lambs fed highly concentrated rations, lending support to the belief that forcing lambs for rapid gains predisposes them to losses from apparently unrelated maladies.
9. The level of soda feeding in these tests was approximately 1/5 ounce per lamb daily. Expressed otherwise this averaged about 1.3 pounds per 100 lambs daily, or slightly less than 1 percent of the concentrates or 1/2 percent of the total feed.

Project 236: The Relationship of Physical Balance and Energy Value in Sheep Rations.

Kansas Agricultural Experiment Station—Manhattan, Kansas
1947-48

THE RELATIONSHIP OF PHYSICAL BALANCE OF THE RATION TO ENERGY VALUE AND TISSUE FORMATION IN FAT LAMBS

Rufus F. Cox, D. L. Mackintosh, Ed F. Smith, J. S. Hughes

Many tests have been completed at this station bearing on some phase of physical balance in sheep rations. Differences in gains consistently have favored a medium proportion of concentrates to roughage over either more concentrated or more bulky rations. It was deemed advisable to determine whether this difference in gains would be expressed in the distribution of fat throughout the carcass.

Sixty Wyoming lambs of the long-wool crossbred type used for this study, were divided into six lots. Lots 1, 2 and 3 were fed corn and alfalfa hay in amounts such that the ratios of crude fiber to digestible nutrients were 1 to 3; 1 to 4; and 1 to 5 respectively. Lots

4, 5 and 6 received oat groast (hulled oats) and alfalfa with the crude fiber: digestible nutrient ratios corresponding to those of lots 1, 2 and 3 respectively.

At the end of the feeding period all the lambs were slaughtered, carcasses graded and physical and chemical studies made on certain tissues. The hotel rack which is considered the most representative cut of the lamb carcass, was taken from the carcasses of three representative lambs from each lot. Manual separation of fat, muscle and bone was made on these cuts and a chemical analysis of the rib-eye muscle made to determine the amount of fat present.

The tables and summary on the following pages give detailed results of these tests.

Kansas Agricultural Experiment Station—Manhattan, Kansas

Crude Fiber: Total Digestible Nutrient Ratios in Lamb Fattening Rations

Rufus F. Cox, D. L. Mackintosh, Ed F. Smith, J. S. Hughes

Table—March 17, 1948 to May 31, 1948—75 Days

| Lot Number | 1 | 2 | 3 | 4 | 5 | 6 |
|----------------------------|-------------|-------------|-------------|------------------------|------------------------|------------------------|
| Ration Fed | Corn Hay | Corn Hay | Corn Hay | Oats Alfalfa Hay | Oats Alfalfa Hay | Oats Alfalfa Hay |
| Ratio (to T. D. N.) | 1 3 | 1 4 | 1 5 | 1 3 | 1 4 | 1 5 |
| No. Lambs per lot | 10 | 9 | 10 | 10 | 10 | 10 |
| Number days on feed | 75 | 75 | 75 | 75 | 75 | 75 |
| Initial weight per lamb | 75.50 | 77.51 | 75.60 | 76.00 | 77.80 | 75.70 |
| Final weight per lamb | 96.10 | 100.22 | 95.30 | 96.60 | 95.50 | 94.10 |
| Total gain per lamb | 20.60 | 22.71 | 19.70 | 20.60 | 17.70 | 18.40 |
| Daily gain per lamb | .27 | .30 | .26 | .27 | .24 | .25 |
| Feed per lamb daily: | | | | | | |
| Grain | 1.04 | 1.29 | 1.44 | .86 | 1.09 | 1.23 |
| Hay | 1.70 | 1.20 | .93 | 2.01 | 1.41 | 1.09 |
| Feed per cwt. gain: | | | | | | |
| Grain | 380.10 | 426.51 | 546.90 | 313.30 | 460.51 | 502.93 |
| Hay | 620.97 | 398.06 | 352.64 | 732.57 | 598.81 | 444.78 |
| Dry matter per lamb daily | 2.51 | 2.27 | 2.16 | 2.65 | 2.31 | 2.15 |
| T. D. N. per lamb daily | 1.76 | 1.71 | 1.70 | 1.85 | 1.76 | 1.72 |
| Gain per 100 lbs. T. D. N. | 15.34 | 17.54 | 15.29 | 14.59 | 13.64 | 14.53 |
| Carcass grades: | | | | | | |
| Choice | 1 | | | | | |
| Good | 4 | 7 | 6 | 3 | 8 | 5 |
| Commercial | 4 | 2 | 2 | 7 | 1 | 5 |
| Utility | 1 | | 2 | | 1 | |
| Coordinated carcass grade | 25 | 28 | 24 | 23 | 27 | 25 |
| Dressing percent | 49.3 | 50.0 | 49.6 | 48.1 | 49.8 | 50.4 |