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by

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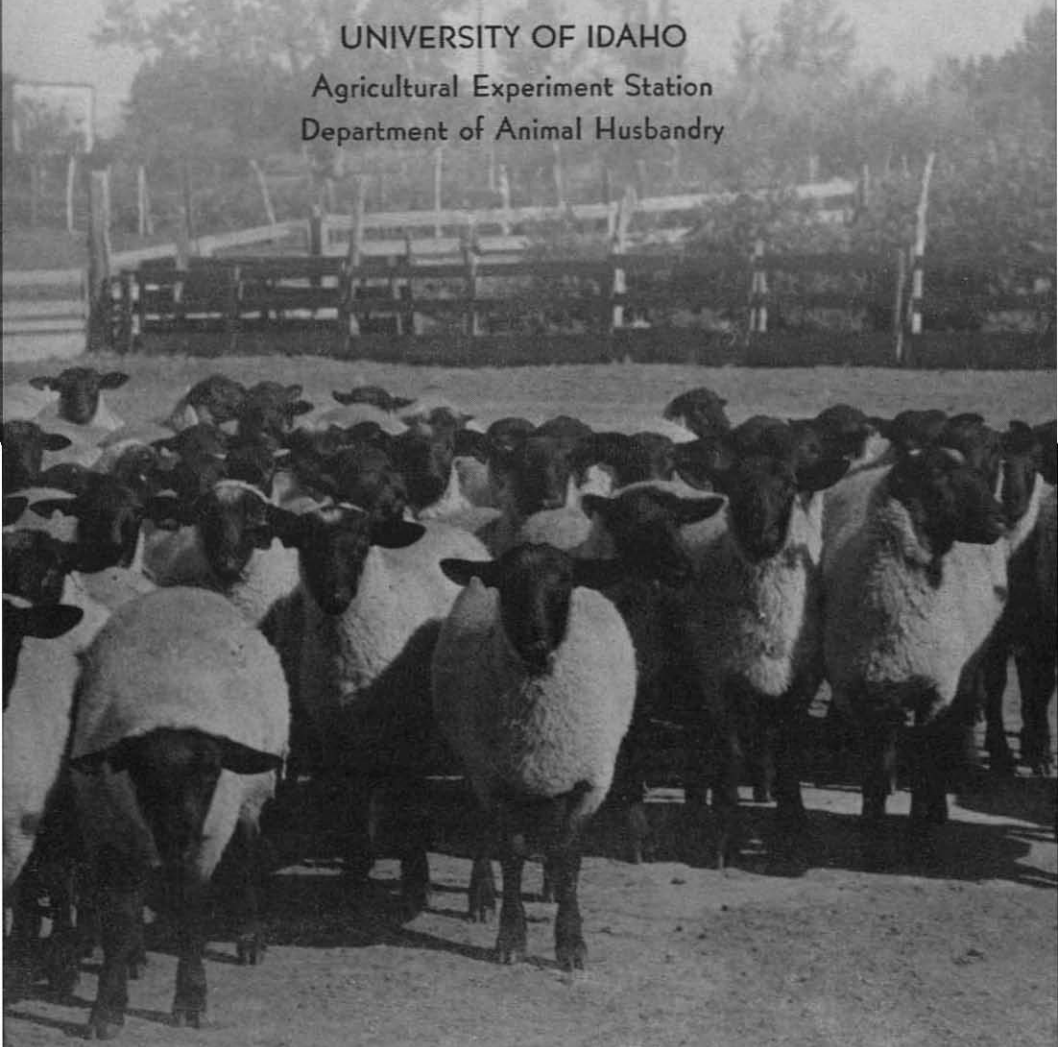

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Concentrate and Alfalfa Hay Ratios for Growing and Fattening Idaho Lambs

D. N. Davison[1], T. B. Keith[2], and C. W. Hickman[3]

Information on the optimum ratio of concentrate to hay to be fed to growing and fattening lambs for the greatest net returns with any feed price relationship is not available for the Idaho lamb feeder. The acreage devoted to alfalfa hay production in the state ranks second only to the total acreage of all cereals. Any informaion that will aid in increasing the utilization of alfalfa or the efficiency of utilization of alfalfa hay will benefit the agricultural program of the state.

The object of this study was to establish ratios of concentrate to hay that could be recommended to the lamb feeder for a particular set of feed prices. A range of ratios was selected to include all possible feed combinations that may be used in Idaho feeding practices.

Experimental Procedure

Forty Suffolk ewe lambs were selected from the University flock and divided into 5 groups of 8 lambs each. All lambs were about 120 days of age and their initial weights ranged from 60 to 105 pounds. They were so chosen as to give a representative range in weight within and among lots. Each lamb was fed twice daily, at 12-hour intervals in an individual stall. The lambs were given all the feed they would consume. They had access to inside and outside runways, free of vegetation. Salt and running water were available at all times.

The concentrate mixture was composed of: 40 parts steam rolled barley, 29 parts steam rolled oats, 20 parts wheat bran, 10 parts linseed oil meal, and 1 part salt.

The alfalfa hay was medium chopped from the first cutting and graded U. S. No. 2. The concentrate and hay were weighed, mixed, and fed together.

Five ratios of concentrate to alfalfa hay were selected and 8 lambs were placed on each ratio. The ratios of concentrate to hay fed were as follows: 2 parts concentrate and 3 parts hay, 1 part concentrate and 1 part hay, 3 parts concentrate and 2 parts hay, 2 parts concentrate and 1 part hay, and 5 parts concentrate and 2 parts hay.

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Table 1. Individual weights, gains, feed intake, and feed requirements of lambs fed a ration consisting of 2 parts concentrate and 3 parts hay—feeding period 77 days.

Lamb No.	Initial Weight	Final Weight	Total Gain	Average Daily Gain	Average Daily Ration	Feed per 100 lb. Gain
	lb.	lb.	lb.	lb.	lb.	lb.
1	105	123	18	.23	3.2	1374
2	94	112	18	.23	3.1	1308
3	88	106	18	.23	3.0	1271
4	87	100	13	.17	2.6	1546
5	85	103	18	.23	3.1	1342
6	76	84	8	.10	2.5	2363
7	80	91	11	.14	2.5	1737
8	66	93	27	.35	2.9	842
Av.	85	101	16	.21	2.8	1345

Table 2. Individual weights, gains, feed intake, and feed requirements of lambs fed a ration consisting of 1 part concentrate and 1 part hay—feeding period 77 days.

Lamb No.	Initial Weight	Final Weight	Total Gain	Average Daily Gain	Average Daily Ration	Feed per 100 lb. Gain
	lb.	lb.	lb.	lb.	lb.	lb.
9	101	124	23	.30	2.8	938
10	97	121	24	.31	3.6	1148
11	96	125	29	.38	3.4	894
12	88	106	18	.23	2.9	1226
13	81	110	29	.38	3.1	821
14	76	100	24	.31	2.9	946
15	79	94	15	.19	2.8	1435
16	62	88	26	.34	2.6	781
Av.	85	108	23	.30	3.0	987

Table 3. Individual weights, gains, feed intake, and feed requirements of lambs fed a ration consisting of 3 parts concentrate and 2 parts hay—feeding period 77 days.

Lamb No.	Initial Weight	Final Weight	Total Gain	Average Daily Gain	Average Daily Ration	Feed per 100 lb. Gain
	lb.	lb.	lb.	lb.	lb.	lb.
17	99	125	26	.34	3.4	1017
18	100	125	25	.32	3.1	939
19	92	126	34	.44	3.4	773
20	91	111	20	.26	3.2	1214
21	81	107	26	.34	2.9	860
22	82	115	33	.43	3.4	788
23	79	109	30	.39	3.4	863
24	64	82	17	.22	2.3	1028
Av.	86	112	26	.34	3.1	903

Table 4. Individual weights, gains, feed intake, and feed requirements of lambs fed a ration consisting of 2 parts concentrate and 1 part hay—feeding period 77 days.

Lamb No.	Initial Weight	Final Weight	Total Gain	Average Daily Gain	Average Daily Ration	Feed per 100 lb. Gain
	lb.	lb.	lb.	lb.	lb.	lb.
25	103	125	22	.29	3.3	1154
26	91	122	31	.40	3.6	895
27	91	118	27	.35	3.1	873
28	82	105	23	.30	3.3	1089
29	83	110	27	.35	3.4	986
30	78	110	32	.42	3.3	795
31	72	98	26	.34	2.5	753
32	73	108	35	.45	3.1	679
Av.	84	112	28	.36	3.2	884

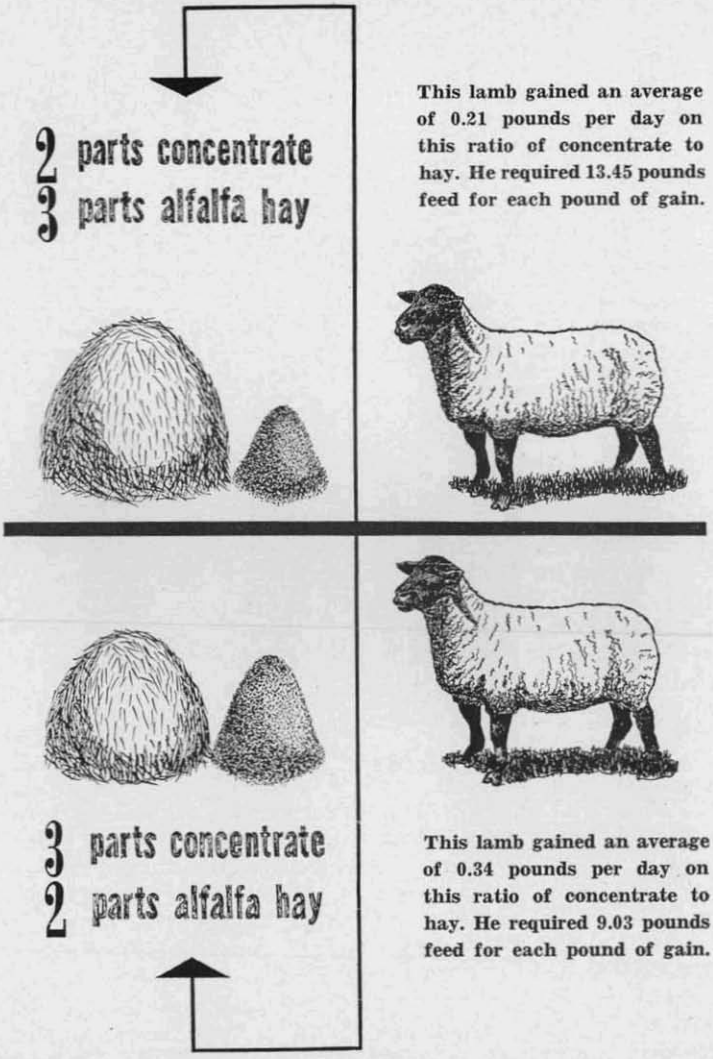
Table 5.—Individual weights, gains, feed intakes, and feed requirements of lambs fed a ration consisting of 5 parts concentrate and 2 parts hay—feeding period 77 days.

Lamb No.	Initial Weight	Final Weight	Total Gain	Average Daily Gain	Average Daily Ration	Feed per 100 lb. Gain
	lb.	lb.	lb.	lb.	lb.	lb.
33	101	139	38	.49	3.6	732
34	88	122	34	.44	3.3	747
35	85	116	31	.40	4.0	1004
36	86	115	29	.38	3.1	818
37	80	109	29	.38	2.9	780
38	82	112	30	.39	3.1	798
39	74	90	16	.21	2.5	1189
40	74	103	29	.38	3.1	823
Av.	84	113	29	.38	3.2	837

Experimental Results

Individual weights, gains, and feed requirements are shown in Tables 1, 2, 3, 4, and 5. A summary of average weights, gains, and feed requirements is given in Table 6. A summary of differences and percentage differences of gain is given in Table 7. The average daily gain ranged from .21 pound for the lambs fed the ration consisting of 2 parts concentrate and 3 parts alfalfa hay, to .38 pound for the lambs fed the ration consisting of 5 parts concentrate and 2 parts of hay. The average daily gain increased progressively with the increase in the percentage of concentrate in the total ration. The differences and percentage differences of gains between ratios may be seen in Table 7. The lambs fed the concentrate to hay ratio of 1 : 1, made .09 pound more average daily gain than the lambs fed the concentrate to hay ratio of 2 : 3. The percentage difference was 43. The lambs fed the ration with the concentrate to hay ratio of 3 : 2 made .04 and .13 pound greater gains than the lambs fed the rations with ratios of 1 : 1 and 2 : 3, respectively. The percentage differences were 13 and 62, respectively. The average daily gain of

the lambs fed the ration consisting of 2 parts concentrate and 1 part alfalfa hay was .02 pound greater than the lambs fed the concentrate to hay ratio of 3 : 2. The percentage difference was only 6. The lambs fed the ration with the concentrate to hay ratio of 5 : 2 made



.02 pound and .04 pound more rapid gains than the lambs fed the rations with the concentrate to hay ratios of 3 : 2 and 2 : 1, respectively. The percentage differences were 6 and 12, respectively.

The feed requirements for each 100 pounds of gain decreased progressively as the percentage of concentrate was increased, ranging from an average of 1345 pounds for the lambs fed the ration with the concentrate to hay ratio of 2 : 3 to 837 pounds for the lambs

fed the ration with the concentrate to hay ratio of 5 : 2. The lambs fed the ration with the concentrate to hay ratio of 1:1 required 358 pounds less feed than the lambs fed the ration with the concentrate to hay ratio of 2 : 3. The percentage difference was 36. The lambs fed the ration with the ratio of concentrate to hay of 3 : 2 required an average of 442 pounds and 84 pounds less feed than the lambs

Table 6. A summary of the average weights, gains, feed intakes, and feed requirements of lambs fed rations with 5 different ratios of concentrate to hay—feeding period 77 days.

Ratio Concentrate to Hay	Number Individuals	Average Initial Weight	Average Final Weight	Average Gain	Average Daily Gain	Average Daily Ration	Av. Daily Concentrate	Average Daily Hay	Av. Feed per 100 lb. Gain
		lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
2 : 3	8	85	101	16	.21	2.8	1.13	1.70	1345
1 : 1	8	85	108	23	.30	3.0	1.51	1.51	987
3 : 2	8	86	112	26	.34	3.1	1.87	1.25	903
2 : 1	8	84	112	28	.36	3.2	2.13	1.07	884
5 : 2	8	84	113	29	.38	3.2	2.29	.92	837

fed the rations with concentrate to hay ratios of 2 : 3, and 1 : 1, respectively. The percentage differences were 49 and 9, respectively. The average feed requirement for the lambs fed the ration with the concentrate to hay ratio of 2 : 1 was 19 pounds less than the feed required for the lambs fed the ration with the concentrate to hay ratio of 3 : 2. The percentage difference was 2. The lambs fed the ration with the concentrate to hay ratio of 5 : 2 required an average of 47 pounds less feed than the lambs fed the ration with the ratio of concentrate to hay of 2 : 1. The percentage difference was 6.

Table 7. A summary of the differences and percentage differences of rations studied.

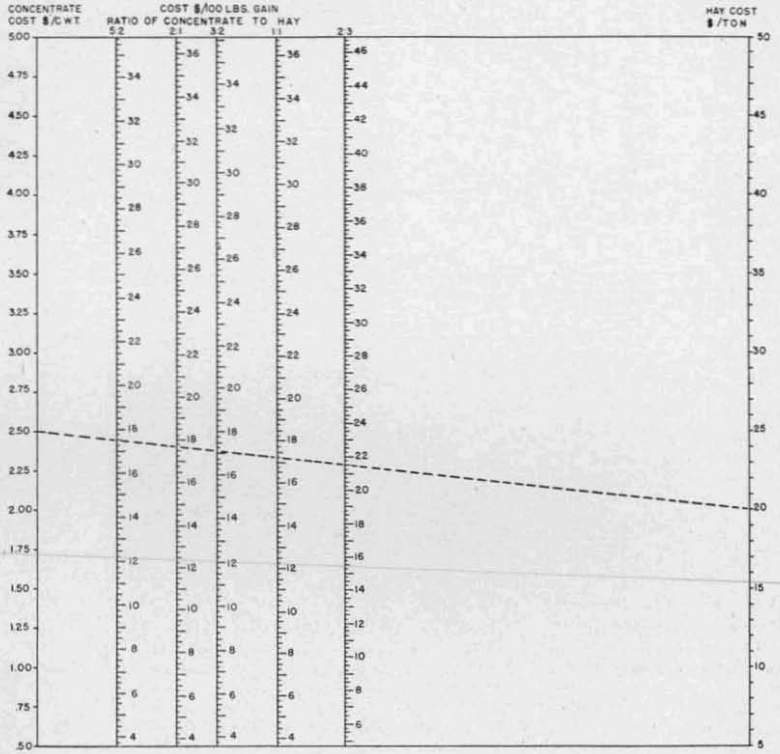
Ratio Comparison		Average Daily Gains		Difference		Feed Per 100 lb. Gain		Difference	
				Lb.	Pct.	Lb.	Lb.	Lb.	Pct.
1 : 1	2 : 3	.30	.21	.09	43	1345	987	358	36
3 : 2	2 : 3	.34	.21	.13	62	1345	903	442	49
2 : 1	2 : 3	.36	.21	.15	71	1345	884	461	52
5 : 2	2 : 3	.38	.21	.17	81	1345	837	508	61
3 : 2	1 : 1	.34	.30	.04	13	987	903	84	9
2 : 1	1 : 1	.36	.30	.06	20	987	884	103	12
5 : 2	1 : 1	.38	.30	.08	27	987	837	150	18
2 : 1	3 : 2	.36	.34	.02	6	903	884	19	2
5 : 2	3 : 2	.38	.34	.04	12	903	837	66	8
5 : 2	2 : 1	.38	.36	.03	6	884	837	47	6

Financial Consideration

Nomograph 1 is a chart from which the lamb feeder may select the ratio of concentrate to hay that will give the greatest return for the prevailing feed prices. Conclusions based on prices prevailing at the time the experiment was conducted may be of little or no value to the average lamb feeder since the relative prices of feed

today in any given market do not apply in any other market and probably will never again prevail. The nomograph presents the cost of 100 pounds of gain of lambs fed each of the ratios of concentrate to hay.

Nomograph 1. For rapid calculation of feed cost per 100 pounds gain of lambs fed 5 different ratios of concentrate to hay.



Feeds and quantity required for each 100 pounds of gain.

Feeds	Ratios of Concentrate to Hay				
	5:2 lb.	2:1 lb.	3:2 lb.	1:1 lb.	2:3 lb.
Barley	239	236	217	197	215
Oats	173	171	157	143	156
Wheat Bran	120	118	108	99	108
Linseed Oil Meal	60	59	54	49	54
Salt	6	6	5	5	5
Hay	239	295	361	494	807

If the lamb feeder desires to determine the most economical ratio of concentrate to hay when the concentrate mixture costs $2.50 and the alfalfa hay costs $20.00 per ton, by placing one end of a straight edge on the left scale at $2.50 and the other end on the extreme right scale at $20.00, he can determine the cost of 100 pounds of gain as given on the intermediate scale for each concentrate to hay ratio.

If we consider the prices of concentrate and hay to be $2.50 and $20.00, respectively, for the feed used in this experiment, the cost of 100 pounds of gain for the different lots is as follows: 2:3—$21.50, 1:1—$17.25, 3:2—$17.00, 2:1—$17.65, and 5:2—$17.50.

If again we consider the prices of concentrate and hay to be $2.00 and $30.00, respectively, for the feed used, the cost of 100 pounds of gain for the same lots is as follows: 2:3—$22.80, 1:1—$17.25, 3:2—$16.25, 2:1—$16.25, and 5:2—$15.00.

When comparing the economies of the two examples shown above, it is apparent that in the event where concentrate prices are low in comparison to hay prices, the rations containing the higher percentages of concentrates tend to be the most economical. It is also apparent that when the prices of concentrates are relatively high in comparison to hay prices that the rations containing a higher percentage of roughage tend to be the more economical. It should be noted, however, that the ration with the concentrate to hay ratio of 2:3 shows very poor economy in both cases and under most feeding practices would not be economical to use.

Conclusions

The most economical ratios of concentrate to any hay for average price relationship will range from 1 : 1 to 3 : 2. A tendency toward a high concentrate price and a low hay price will favor greater returns for the 1 : 1 ratio. A low concentrate and a high hay price relationship will give greater monetary returns for a 3 : 2 ratio.

The average daily gains ranged from .21 pound for the lambs fed the ration consisting of 2 parts concentrate and 3 parts alfalfa hay to .38 pound for the lambs fed the ration consisting of 5 parts concentrate and 2 parts alfalfa hay. The average daily gain increased progressively with the increase in the percentage of concentrate in the whole ration.

The total feed required for each 100 pounds of grain decreased progressively as the percentage of concentrate was increased. The requirement ranged from an average of 1345 pounds for the lambs fed the ration consisting of 2 parts concentrate and 3 parts hay to an average of 837 pounds for the lambs fed the ration containing 5 parts concentrate and 2 parts hay.

The lambs fed a ration consisting of 3 parts concentrate and 2 part alfalfa hay made the most economical gains in the 77-day feeding trial for average feed price relationships. The lambs fed a ration consisting of 2 parts concentrate and 3 parts hay made the least gains and the most expensive gains in the feeding trial.

The lambs fed the ration consisting of 3 parts concentrate and 2 parts hay made an average of 62 percent more gain and required 49 percent less feed for each 100 pounds of gain than the lot with the concentrate to hay ratio of 2 : 3.

A ration composed of 2 parts concentrate and 3 parts alfalfa hay should make an excellent ration for growing ewe lambs that are to be used for breeding.