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THE RESPONSE OF BEEF CATTLE TO PELLETTED AND COARSELY
CHOPPED MOUNTAIN MEADOW HAY WITH DIGESTIBILITY COMPARISONS

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Large quantities of meadow hay are fed as the major component in the wintering ration for beef cattle throughout much of the west. It is anticipated that practical equipment will be developed for field-pelleting large areas of meadow hay in the near future. Such a development will receive rapid acceptance by many range cattle producers to take advantage of the labor and storage saving features of pelleted forages. Basic information on the nutritive value of pelleted meadow hay will then be in great demand.

Feeding pelleted roughages to beef cattle has resulted in increased daily gains and improved feed conversion in several trials (Webb et al., 1957; Anderson et al., 1958; Weir et al., 1959). These workers are in agreement that the increase in performance due to feeding pelleted roughages is due primarily to increased feed consumption. Pelleting lower quality roughages has generally been found to result in a greater increase in animal performance than when high quality roughages are fed in the pelleted form.

Experiments conducted in Scotland (Blaxter et al., 1956; Blaxter and Graham, 1956) indicated that pelleted dried grass passed through the digestive tract more quickly and had a lower digestibility than chopped grass. Workers in this country have reported little difference in digestibility of roughages due to pelletting (Long et al., 1955; Esplin et al., 1957; Meyer et al., 1959). In a recent study with alfalfa, Weir et al. (1959) found that pelletting had little effect on protein digestibility but lowered crude fiber digestibility especially when barley was included in the ration.

The purpose of the work reported in this paper was to compare winter performance of weaner calves fed chopped meadow hay with those fed pelleted meadow hay and to make digestibility comparisons between the two forms of hay.

PROCEDURE

Six uniform Hereford steer calves were randomly allotted into two groups of 3 animals each. All animals were individually fed a ration consisting solely of meadow hay ad libitum. One group received the hay in a coarsely chopped form while the other group received the same hay in a finely ground, pelleted form. All of the hay was grown in

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the same meadow on the Squaw Butte-Harney Station. The hay consisted primarily of rush (*Juncus* spp.) and sedge (*Carex* spp.) with minor amounts of grass and native clover. The hay was cut in early July and stacked. The entire stack was coarsely chopped in December and stored. The portion fed as pellets was ground through a 5/32-in. screen and processed into 3/4-in. pellets. No molasses or other concentrates were added to the pellets. The chemical composition of the two forms of hay is shown in table 1. The composition values are averages of daily samples collected during two 5-day digestion trials. As yet, no explanation is offered for the slightly higher crude protein content and lower cellulose content in the pelleted hay.

Table 1. Summary of crude protein, cellulose, and gross energy content of the chopped and pelleted rations^a.

Item	Chopped hay	Pelleted hay
Crude protein (%)	7.6	9.7
Cellulose (%)	35.7	29.0
Gross energy (therms/lb.)	1.91	1.90

^aDry matter basis.

The calves were hand-fed once daily and had access to their feed from 7 a.m. until 3 p.m. Salt and a 50:50 salt:bone meal mix was available to all animals during the rest of the 24-hour period. Water was available at all times. A limited amount of chopped hay was used to start one pellet-fed animal on feed. Weights were taken at 14-day intervals following overnight restriction from feed and water. Initial and final weights were the average of 2 consecutive day weights. The feeding trial was conducted for an 84-day period.

Total fecal collections were made from all animals during two 5-day collection periods. A preliminary period was used to allow the animals to become accustomed to the collection bags.

RESULTS AND DISCUSSION

Gain and feed consumption data are summarized in table 2. Pellet-fed calves gained over 5 times more rapidly than those fed chopped hay. Feed consumption was increased 50% by pelleting the hay. Likewise, feed required per pound of gain and feed cost per lb. of gain was considerably less for the pellet-fed animals. It seems reasonable to assume that reasons for the increased hay intake of the pelleted ration could be:

- a. Faster rate of digestion and movement from the reticulo-rumen due to fine grinding which in turn increased the animals appetites.
- b. Increased density of the pelleted hay (a bushel of pelleted hay weighed 50 lb. as compared to 7 lb. for the coarsely chopped hay).

- c. Reduced dust and interference of coarse stems or other foreign material, commonly found in meadow hay, that could reduce feed intake due to mechanical irritation to the animal.

Table 2. Summary of 84-day feeding trial

Item		Chopped hay ^a	Pelleted hay ^a
Initial weight	(lb.)	364	365
Final weight	(lb.)	390	500
Average daily gain	(lb.)	0.31	1.61
Daily feed intake	(lb.)	9.36	14.09
Feed/lb. gain	(lb.)	30.19	8.75
Feed cost/lb. gain ^b	(¢)	30.3	13.1

^a3 calves per treatment.

^bFeed costs assigned were: Chopped hay, \$20 per ton and pelleted hay, \$30 per ton.

Results of the digestion trial are shown in table 3. Pelleting the hay significantly lowered ($P < 0.01$) the apparent digestibility of cellulose. Apparent digestible gross energy and calculated T.D.N. was slightly higher for the chopped hay. The digestible energy figures for the 2 forms of hay compare favorably with those reported by Blaxter and Graham (1956) on pelleted grass and are in contrast to the work reported by Meyer *et al.*, (1959) with pelleted alfalfa hay. The California workers found slightly higher digestible energy and T.D.N. for the pelleted forage as compared to unpelleted forage.

Table 3. Average results of two 5-day digestion trials

Apparent digestibility		Chopped hay	Pelleted hay
Dry matter	(%)	54.8	54.0
Organic matter	(%)	58.6	56.7
Cellulose	(%)	66.7 ^a	56.8 ^a
Digestible energy	(therms/lb.)	1.09	1.06
Total digestible nutrients ^b		54.6	53.0

^aSignificantly different ($P < 0.01$).

^bCalculated according to Swift (1957) (2000 Kcal = 1 lb. T.D.N.).

The formula reported by Winchester and Hendricks (1953) was used to calculate T.D.N. required for maintenance for calves on each

treatment (table 4). Deduction of the maintenance requirement from the daily T.D.N. intake showed that calves on the pelleted hay had 4.30 lb. of T.D.N. available for growth as compared to 2.22 for calves fed chopped hay. Such calculations further indicated that the pellet-fed calves were considerably more efficient in converting T.D.N. above maintenance to gain than were calves on the chopped hay ration. This is perhaps indicative of a higher net energy value for pelleted hay which was reported by Blaxter and Graham (1956) in their work with pelleted grass in Scotland.

Table 4. Calculated T.D.N. required for maintenance and available for growth for calves fed chopped and pelleted hay

Item	Chopped hay	Pelleted hay
Daily T.D.N. intake ^a (lb.)	5.11	7.47
Daily T.D.N. for maintenance ^b	2.89	3.17
Daily T.D.N. available for growth (lb.)	2.22	4.30
T.D.N. above maintenance/lb. gain (lb.)	7.16	2.67

^aCalculated from digestible energy values (table 3) according to Swift (1957).

^bCalculated according to Winchester and Hendricks (1953).

SUMMARY

Mountain meadow hay was fed to Hereford steer calves in chopped and pelleted forms. Average daily gain, feed intake, and feed efficiency were greatly increased by pelleting. Deducting the T.D.N. required for maintenance from the daily T.D.N. intake showed that the pellet-fed calves had nearly twice as much T.D.N. available for growth as compared to calves fed chopped hay.

Digestibility comparisons were made between the two forms of hay. Little difference was noted in apparent dry matter digestibility. Apparent cellulose digestibility was significantly higher for the chopped hay ration. Slightly higher values for chopped hay were observed in so far as apparent digestible energy and calculated T.D.N. values were concerned.

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