

Hay: Limited or Free-Choice for Weaned Calves?

- Heifers fed 16.5% c.p. rations had approximately 20% better gains when fed lower fiber rations (5% hay or cottonseed hulls) compared to high fiber rations (15% hay or cottonseed hulls).
- Heifers fed 16.5% c.p. rations had approximately 17% better gains at both levels of hay intake compared to 13.5% c.p. rations.

How does our choice of hay feeding method affect the gains of weaned dairy calves? The authors of a study “Roughage for Diets Fed to Weaned Dairy Calves” claim that our decisions about hay feeding have a substantial effect.

The First Trial

This research used Holstein calves with initial weaned weights of around 175 pounds (79kg). Their first four-week long trial with 96 calves looked like this (four rations):

Ration#1: Free-choice grain/hay blend at 13.5% c.p. (hay = 4.5%). Grass hay was coarsely chopped mixed thoroughly with the grain (**low protein, hay blend**)

Ration#2: Free-choice grain/hay blend at 16.5% c.p. (hay = 4.5%). Grass hay was coarsely chopped mixed thoroughly with the grain. (**high protein, hay blend**)

Ration #3: Five pounds grain daily at 13.5% c.p. with free-choice grass hay (**low protein, high hay**)

Ration #4: Five pounds grain daily at 16.5% c.p. with free-choice grass hay (**high protein, high hay**)

What was the outcome? The rations are listed in descending order of rate of gain:

Ration #2: 2.0 pounds a day gain - Free-choice grain/hay blend, 16.5% protein

Ration #1: 1.7 pounds a day gain - Free-choice grain/hay blend, 13.5% protein

Ration #4: 1.4 pounds a day gain - Five pounds grain with free-choice hay, 16.5% protein

Ration #3: 1.2 pounds a day gain - Five pounds grain with free-choice hay, 13.5% protein

Compare rations 2 and 1 – 16.5 percent crude protein (c.p.) ration had higher gains than 13.5 percent c.p. Compare rations 4 and 3 – same finding. **In both cases the calves with the 16.5 percent protein rations out gained those with the lower protein levels.**

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As the authors point out the ratio of crude protein to metabolizable energy was too low; it was considerably less than the protein to energy ratio which optimizes average daily gain in 8 to 20 week old calves.

Now, compare rate of gain on the best ration, #2, with the rate of gain on ration I see most often on dairy farms, #3:

#2 Free-choice grain/hay blend, 16.5% = 2.0 pounds a day gain

#3 Five pounds grain with free-choice hay, 13.5% protein = 1.2 pounds a day gain

Difference? 67 percent more gain when we feed a free-choice higher protein ration – grain blended with limited hay.

Bottom Line: Free choice forage may do a good job of filling up young calves but it does not drive growth! And, providing adequate protein is essential for young heifers.

The Second Trial

Their second four-week long trial with 96 calves looked like this (**four rations all with 16.5% protein**):

Ration #1: Free-choice grain/hay blend at 5 percent chopped grass hay

Ration #2: Free-choice grain/hay blend at 15 percent chopped grass hay

Ration #3: Free choice grain/cotton seed hulls, 5 percent hulls

Ration #4: Free choice grain/cotton seed hulls, 15 percent hulls

Outcomes were measured in rate of gain and feed efficiency. No significant differences were found in efficiency of feed conversion.

Both lower fiber rations (numbers 1 and 3) resulted in higher rates of weight gain than those with higher fiber (numbers 2 and 4) – see the listing below ranked in order of gain:

Ration #1: 2.3 pounds a day gain - Free-choice grain/hay blend at 5 percent chopped grass hay

Ration #3: 2.2 pounds a day gain - Free choice grain/cotton seed hulls, 5 percent hulls

Ration #2: 1.9 pounds a day gain - Free-choice grain/hay blend at 15 percent chopped grass hay

Ration #4: 1.9 pounds a day gain - Free choice grain/cotton seed hulls, 15 percent hulls

Rations with the lower level of fiber (5% hay or hulls) consistently had higher rates of gain compared to the two rations with the higher level of fiber (15% hay or hulls).

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Nevertheless, the heifers on all four rations with 16.5% protein had what would be acceptable average daily gains for most farms – low of 1.9 and high of 2.3 pounds.

In another study involving seven and eight week-old heifers that were weaned at forty-two days found positive results for including forage (chopped oat hay) to the ration. That is, the consumption of limited hay (about three ounces) right after weaning compared to a grain-only ration increased average daily gain by thirty percent during the two weeks right after weaning.

What do we conclude about feeding forage to weaned heifers?

1. **A limited amount of forage works well.** Remember that too much forage depresses dry matter intake in these animals with small rumen capacities.
2. **Feed enough protein to take advantage of young heifers' ability to grow rapidly.** Blend high-protein pellets with hay to get no less than 16.5 percent crude protein mix.
3. When feeding free-choice hay/grain mix, the range of 5 to 15 percent hay may be predicted to give satisfactory gains (1.9 – 2.3 pounds per day) although **less hay may result in roughly 20 percent higher gains compared to the higher level.**
4. **Feeding free choice hay to young heifers (seven to ten weeks of age) is very likely to result in unsatisfactory rates of gain.**

References: T.M. Hill, H.G. BatemanII, J.M. Aldrich, R.L. Schlotterbeck, "Roughage for Diets Fed to Weaned Dairy Calves." The Professional Animal Scientist 25:283-288 (2009). M. Terre, E. Pedrals, A. Dalmau, and A. Bach "What do preweaned and weaned calves need in the diet: A high fiber content or a forage source?" Journal of Dairy Science 96:5217-5225 (2013)