



Benefits of Exposing Animals to Poor-Quality Foods Early in Life

Beth Burritt

If feeding poor-quality forages (less than 7% crude protein and 50% TDN) are a necessary part of your livestock operation, exposing replacement females to poor-quality roughage early in life with their mothers may make them more productive over their lifetimes. On the other hand, feeding replacement females high-quality diets early in life may actually hinder animals that are expected to produce and reproduce on rangeland that contains poor-quality forages and forages high in toxins.

Below are research examples of how exposure early in life to poor-quality or high-toxin forages can increase intake and preference for certain forages and improve the productivity of livestock.

Intake

Exposing young animals to poor-quality forages prior to weaning and with their mothers may increase intake and preference for those foods later



in life. Goat kids foraged on blackbrush with their mothers for 3 months when they were 1 to 4 months of age. Another group of kids were not fed blackbrush until after they were weaned at 4 months of age. As yearlings, goats with early exposure ate 20% more blackbrush than goats not exposed to the shrub until 4 months of age (Distel and Provenza, 1991). Blackbrush is a low-quality, high-tannin forage that grows in southern Utah.

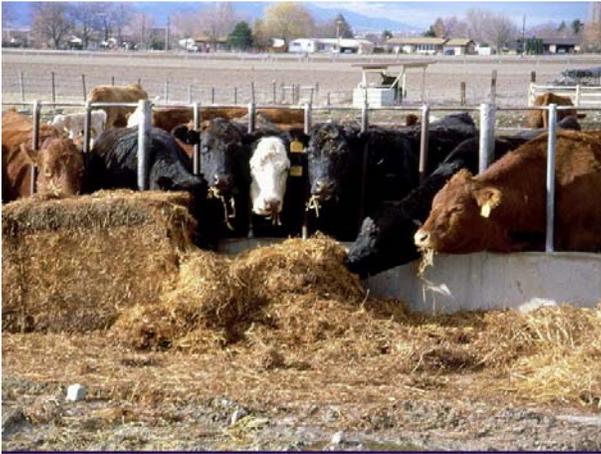
Preference

Early exposure affects preference for poor-quality foods. Two groups of goats had different experiences with blackbrush. One group ate blackbrush with their mothers when they were 1 to 4 months of age. The other group didn't eat blackbrush until they were 4 months old, after weaning, and without mom. As yearling, the goats were given a choice of alfalfa pellets and blackbrush. Goats exposed early with mom ate 30% more blackbrush than goats exposed later without mom (Distel and Provenza 1991). Similar results have been reported for sheep eating poor-quality grass hay (Distel et al. 1994).

Weight Changes

Early experience in life can affect how animals perform on a feed much later in life. Five-year-old cows wintered on two-thirds ammoniated straw and one-third alfalfa hay gained 81 pounds from December to March provided they had been exposed to ammoniated straw with their mothers early in life. Cows without exposure lost 48 pounds

during the same period. Interestingly, weight differences between the two groups persisted over the summer. The following November, cows experienced at eating ammoniated straw still weighed 48 pounds more than inexperienced cows. Differences in weight for the two groups of cows persisted for at least three years (Wiedmeier et al. 2002).



A little exposure to ammoniated straw can go a long way. Half the cows in this study were exposed as calves to ammoniated straw during late gestation and early lactation. After weaning, all cows were fed high-quality diets until they were 2 ½ years of age. They were not fed ammoniated straw again until 5 years of age. When both groups of cows were wintered on ammoniated straw and alfalfa, those who had brief exposure to straw in utero and soon after birth enabled them to out-perform cows without exposure to ammoniated straw as calves.

Milk Production and Post-partum Interval

In the study above, cows with prior exposure to ammoniated straw bred back 9 days sooner and produced 20% more milk than cows without exposure (Wiedmeier et al. 2002).

Digestibility and Nitrogen Recycling

Exposure to foods early in life can even change how the body works. For example, lambs fed to poor-quality roughage with their mothers when they were 1 to 4 months of age digested poor-quality forages to a greater extent (55.1% vs. 50.6%) than lambs without exposure to poor-quality forages. Lambs experienced with poor-quality roughage also recycled nitrogen more efficiently than lambs without experience (Distel et al. 1994, 1996).

Saltbush

Early exposure to saltbush (*Atriplex nummularia*) improves performance on saltbush. One group of pregnant ewes grazed saltbush from the 60th day of pregnancy until 3 weeks after lambing. The other group of ewes grazed pasture during and after pregnancy. When lambs from both groups were 10 months of age, they grazed saltbush for 8 weeks. Lambs from ewes that ate saltbush during and after pregnancy gained more weight, had heavier fleece weights, and increased excretion of salt from the body than lambs from ewes that grazed pasture during and after pregnancy (Chadwick et al. 2009). Note: There are several saltbushes that grow in Utah including fourwing, mat, Gardner, and shadescale. All are palatable to livestock.

Plants High in Toxins

Animals are more likely to eat plants high in toxins, like sagebrush, if their first experience with the plant is positive. For example, one group of lambs was fed an alfalfa-grain mix immediately before and after eating an unfamiliar, poor-quality, high-toxin feed. The other group was fed the same alfalfa-grain mix and the unfamiliar, poor-quality, high-toxin feed at different times of the day. Lambs fed the high-quality feed and high-toxin feed closely in time, ate more of the toxin-containing feed and spent less time searching for other feeds than lambs fed the two feeds at different times of the day (Baraza et al. 2005). In addition, lambs eating a tannin-containing feed and a high-quality feed in the same meal showed greater preference for the tannin-containing feed than animals that ate the two feeds in separate meals (Villalba et al. 2006).

Supplements

From the studies above one would think that feeding young animals poor-quality forages early in life with their mothers and in conjunction with nutritious supplements should markedly increase preference and intake for poor-quality forages, but that's not always the case. From 2 to 7 months of age one group of lambs was fed mature oat hay (poor-quality forage) and supplemented with *unlimited* sunflower meal (high-protein) and corn (high-energy). Another group of lambs was fed the same feeds except alfalfa hay was substituted for the oat hay. At 8 months of age, lambs fed mature oat hay early in life ate less oat hay than lambs fed alfalfa hay early in life except when oat hay was the only feed available. In general, lambs experienced

with mature oat hay also had a lower preference for mature oat hay than lambs that had less experience with the hay (Catanese et al. 2010).

Conclusion

So how should a producer expose young animals to poor-quality feeds to improve intake, preference and performance later in life? Feed young animals and their mothers unlimited poor-quality forages without supplement. For young animals, milk will supplement poor-quality forage. However, if forages don't provide adequate nutrition especially for mom during lactation, providing *limited* amounts of high-quality supplements will boost nutrition and encourage and enable mom and her offspring to eat poor-quality feeds and still provide benefits when animals eat poor-quality foods later in life.

References

- Baraza, E., J.J. Villalba, and F.D. Provenza. 2005. Nutritional context influences preferences of lambs for foods with different plant secondary metabolites. *Applied Animal Behavior Science* 92:293–305.
- Catanese F., R.A. Distel, R.M. Rodríguez Iglesias, and J.J. Villalba. 2010. Role of early experience in the development of preference for low-quality food in sheep. *Animal* 4:784–791.
- Chadwick, M.A., I.H. Williams, P.E. Vercoe, and D.K. Revell. 2009. Feeding pregnant ewes a high-salt diet or saltbush suppresses their offspring's postnatal renin activity. *Animal* 3:972–979.
- Distel, R.A., and F.D. Provenza. 1991. Experience early in life affects voluntary intake of blackbrush by goats. *Journal of Chemical Ecology* 17:431–450.
- Distel, R.A., J.J. Villalba, and H.E. Laborde. 1994. Effects of early experience on voluntary intake of low-quality roughage by sheep. *Journal of Animal Science* 72:1191–1195.
- Distel, R.A., J.J. Villalba, H.E. Laborde, and M.A. Burgos. 1996. Persistence of the effects of early experience on consumption of low-quality roughage by sheep. *Journal of Animal Science* 74:964–968.
- Villalba, J.J., F.D. Provenza, and R. Shaw. 2006. Initial conditions and temporal delays influence preference for foods high in tannins and for foraging locations with and without foods high in tannins by sheep. *Applied Animal Behavior Science* 97:190–205.
- Wiedmeier, R.D., F.D. Provenza, and E.A. Burritt. 2002. Exposure to ammoniated wheat straw as suckling calves improves performance of mature beef cows wintered on ammoniated wheat straw. *Journal of Animal Science* 80:2340–2348.

Utah State University is committed to providing an environment free from harassment and other forms of illegal discrimination based on race, color, religion, sex, national origin, age (40 and older), disability, and veteran's status. USU's policy also prohibits discrimination on the basis of sexual orientation in employment and academic related practices and decisions.

Utah State University employees and students cannot, because of race, color, religion, sex, national origin, age, disability, or veteran's status, refuse to hire; discharge; promote; demote; terminate; discriminate in compensation; or discriminate regarding terms, privileges, or conditions of employment, against any person otherwise qualified. Employees and students also cannot discriminate in the classroom, residence halls, or in on/off campus, USU-sponsored events and activities.

This publication is issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Kenneth L. White, Vice President for Extension and Agriculture, Utah State University.