

# Feeding cull onions: the 'ins' and 'outs'

By Ed Fredrickson

The most costly aspect of any sheep operation is the cost associated with feed. Because of this, a resourceful operator is always looking for ways to cut feed costs as a means of increasing profits. One potential source of low cost, good quality, feed is cull onions.

According to the National Agricultural Statistics Service, America produced over 5.3 billion pounds of onions in 1990. Each year more than 10 percent of the onions produced for fresh market use are culled for various reasons. Russell Matthews of the New Mexico Department of Agriculture states that cull onions present onion packers with a difficult disposal problem. Increasing landfill restrictions and concerns for groundwater contamination have limited the use of landfills. Plowing onions into fields is a viable option; however, onions plowed into the field can promote soil pathogens which can damage the following year's onion crop.

Pilfering of cull onions is another problem. People removing cull onions for home consumption, or for sale, decrease the market demand for onions, which subsequently affects onion prices. So producers favor a destructive method of disposal.

Feeding cull onions to livestock is a destructive method of disposal, that also can benefit livestock producers. Despite the potential benefits of feeding cull onions to livestock, little research has been completed that examines the viability of using onions as feed. Indeed, most of the reports in the literature only describe cases when onions have been toxic to livestock that have eaten onions in large amounts. In spite of these reports, some innovative sheep producers successfully feed onions.

The toxicity of onions is due to sulfur compounds within the onion. Sulfur groups bound to amino acids are cleaved from their respective amino acid by specific enzymes when the onion is crushed or the cells are disrupted by other means. These sulfur groups enter the bloodstream where they interfere with the production of usable energy by red blood

cells. Since most of the energy produced by the red blood cell is used to repair cellular damage, the red blood cell cannot repair itself and begins to degenerate. First the hemoglobin loses its ability to carry oxygen and with time the cell membrane becomes weak and ruptures. If enough cells rupture, then the oxygen carrying capacity of the blood is severely reduced and the animal suffocates to death. Interestingly, these and similar sulfur compounds are responsible for the pungent taste of onions and bringing tears to your eyes.

As with any compound, or element, its toxicity is dependent upon the dose administered (note that even water and oxygen are toxic in large quantities). Therefore, we felt that the success to feeding onions is probably dependent upon knowledge of optimum levels of feeding of onions and associated dietary conditions. With assistance from the New Mexico Dry Onion

Commission, we completed two studies examining the effect of onions on animal health, growth and digestive efficiency. The first study was conducted to determine what proportion of diet could be onions, without negatively affecting animal health or weight gain. Whole grain sorghum served as a control feed to determine if onions could possibly replace sorghum or other grains in rations for growing animals. Chemical analyses of onions showed onions are quite high in readily digestible energy, and low in fiber. These results are similar to results obtained for cereal grains such as grain sorghum.

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We used 56 ram lambs of a Polypay x Rambouillet cross with an average initial body weight of 71 pounds. The lambs were sorted into eight pens, with each pen of seven lambs being fed one of four different diets. Of each diet 50 percent of the dry matter consisted of a 19 percent crude protein alfalfa pellet with the remainder of diet being either: 1) 50 percent sorghum, 2) 33 percent sorghum and 17 percent cull onions, 3) 17 percent sorghum and 33 percent onions, or 4) 50 percent onions. Pens received each diet to provide each animal 3.8 percent of its body weight, as dry matter, for a six-week period.

Once each week, before the morning feeding, we weighed each animal and obtained a blood sample to determine the proportion of red blood cells in blood. If red blood cells were being lost greater than they were being replaced the proportion of red blood cells should decrease. At the beginning of the study, and at the end of weeks 1, 3, and 6, blood samples were also used for routine analyses of serum chemistry. Data obtained from the serum chemistry was important because if red blood cells were rapidly being replaced

then the proportion of red blood cells may not be a good indicator of cell losses. Serum chemistry analysis includes estimates of enzymes and hemoglobin byproducts lost to the serum when red blood cells rupture, since these estimates are not affected by red blood cell replacement they are better indicators of the effects of onions on red blood cells. As depicted in figure 1 all lambs lost some weight during the first week. However, the lambs receiving 33 and 50 percent of their diet as onions lost more weight than animals receiving the other diets. This was probably because lambs fed onions did not readily consume onions initially. During the second week, lambs receiving 50 percent of their diet as onions gained only 0.4 pounds per day, while the remaining lambs gained between 0.6 and 0.8 pounds per day. Daily weight gain during week three was greater for the lambs eating onions than for lambs eating

and red blood cell enzymes were found were in greater concentrations in the serum of lambs eating onions. However, the effect of onions on red blood cells gradually declined through the remainder of the study. This decline probably signifies that the lambs were somehow adapting to the sulfur compounds in onions.

The lambs did not readily eat the onions at first, however after the second week all lambs eagerly consumed onions. In fact, several of the lambs appeared to prefer onions to alfalfa. Even lambs eating over 12 pounds of fresh onions per day exhibited a preference for onions. Amazingly, this amount of onions would be equivalent to a 150 pound man eating 29 pounds of fresh onions each day.

Many sulfur compounds in onions appear to function as antibiotics. We speculated that onions might negatively impact ruminal bacteria, and consequently affect the digestion of many feedstuffs. Bacteria in the rumen are largely responsible for the breakdown of fibrous feeds into compounds that the lamb can use for various bodily functions such as growth. In addition, because onions are 90 percent water, animals consuming onions also have a higher water intake. Increased water intake also could affect bacterial populations in the rumen by washing bacteria out of the rumen. This would reduce the number and affect the type of bacteria present in the rumen. Higher water intake might also decrease the resident time of feed particles in the rumen which in turn reduces the amount of time feed particles are subjected to bacterial degradation. Again, this effect can reduce the digestion of fibrous feeds.

Our second study was established to determine if a diet consisting of onions negatively influences digestion of fibrous feeds, such as hay. For this study we used 15 wethers weighing about 110 pounds. Each wether was fitted with a cannula to maintain easy access to the rumen. The diets were similar to the study described earlier with 50 percent of the dry matter

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only sorghum grain and alfalfa pellets. However, a general lack of weight gain existed for all diets during week 3. This lack of gain is attributed to rainfall occurring during a period when maximum daily temperatures exceeded 100° F, causing hot and humid conditions. The rate of gain for the remainder of the study was similar for all pens (.4 to .6 pounds per day). Over the course of the study average daily gain was not affected by diet.

Sulfur compounds in the onions did cause the loss of some red blood cells. However, all values were well within normal limits. By the third week the percentage of red blood cells in the blood dropped marginally in the lambs eating either 33 or 50 percent of their diet as onions. Serum chemistry analyses also indicated that some red blood cells were affected. Both hemoglobin byproducts



Polypay X Rambouillet lambs eagerly consumed onions after the first week.

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# Research —

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percent), Iowa (8 percent), Ohio (7 percent), Indiana (7 percent), Oregon (5 percent), Illinois (4 percent), Washington (4 percent), Michigan (4 percent) and Minnesota (4 percent). The average flock size is 50 ewes, but there are more flocks in the 11 to 20 ewe range than any other group, followed by 21 to 30 ewe flocks, 41 to 50 ewe flocks and 31 to 40 ewe flocks. The largest flock enrolled has 1,525 ewes. There are over 60 flocks with 10 or fewer ewes. The weights that breeders can receive genetic evaluations for and the percentage of flocks recording each weight are: 30-day weight (14 percent), 60-day weight (30 percent), 90-day weight (27 percent), 120-day weight (23 percent), 180-day weight (4 percent) and 365-day weight (2 percent).

NSIP can provide genetic evaluations for reproductive, growth and fleeces traits. Currently the genetic evaluations are only comparable within the flock. However, there is interest in across flock evaluations in some breeds which will allow animals in different flocks to be compared directly for estimated genetic value. The American Polypay Sheep Association is moving ahead with plans for an across flock genetic evaluation using NSIP, and if successful, will be the first breed of sheep to obtain this all-important information for genetic improvement. Such across herd genetic evaluations have been responsible for the tremendous genetic progress which has taken place for many years in dairy cattle, somewhat more recently in beef cattle and very recently in swine.

## Further reading

Young, L.D., B.A. Freking and M.H. Wallace. 1991. *Comparison of Romanov and Finnsheep mated to Composite III ewe lambs. Sheep Research Program Progress Report No. 4. USDA ARS-97-1. pp. 23-24.*

Wilson, D.E. and D.G. Morrical. 1991. *The National Sheep Improvement Program: A review. Journal of Animal Science. Vol. 69. pp. 3872-3881.*

Nelson, J.L., D.G. Landblom, S. Silky and T.J. Conlon. 1992. *Multi-species grazing of native range in western North Dakota. Proceedings 33rd Annual Western Dakota Sheep Day, Hettinger Research and Extension Center, North Dakota State University. pp. 42-46.*

## Guard dog—

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world sheep festival this year. Interestingly, when Cosmo was in the pen with the sheep and a dog came up to the pen, he was impressively protective. On the other hand, when he was lying next to us under the tent not 20 feet from the sheep, he would let a dog come right up to him without showing any hostile reaction. This demonstrated that he was protective and not aggressive, and that he also could make the decision when he needed to be protective and when he didn't. He obviously thought that the sheep needed his protection from the dogs and that we didn't!

the same when people come down to the barn with us. The dogs readily accept chaperoned visitors. However, come up to the fence line from the road or any outlying area and you will be greeted by big white dogs barking with hackles raised relaying in no uncertain terms their lack of welcome.

Fence climbing or jumping can be an acceptable or unacceptable behavior depending on your situation. If you have one dog and many pens you may want a dog to be able to move in and out freely. This situation would necessitate a well sheep bonded dog with little human bonding or it will jump out and be at your door. At our place we want dogs to stay in the pastures that we put them in so we don't want a dog to jump. What we do to discourage this is place one strand of electric fence wire about 3/4 feet up from ground around the puppy pen. The first time it tries to climb it is shocked and before long is conditioned not to climb.

Occasionally people relate that the guardian dog, during its first lambing season, considers the lambs outsiders and destroys them. I have never experienced this, if anything our dogs try to mother new lambs. What we do is place a pup in a pen near the lambing pens so that the pup can observe the first few lambings. We also walk the dog on a leash in the lambing area to introduce the pup to the lambing process and protect the pup from aggressively protective ewes! After the pup is introduced to a couple birthings they usually accept lambs as part of the flock without any problems.

The 9-19 months of supervision may seem like a long and frustrating period but it is well worth the effort to have a safe and trusted livestock guardian overseeing the welfare of the flock.

We have both coyotes and neighbors with free running packs of dogs and our Akbash dogs have afforded us with peace of mind both while we are at work and at night while we are asleep!

## Additional reading

*Livestock Protection Dogs Selection, Care and Training, By David E. Sims, Ph.D. & Orysia Dawydiak. OTR Publications, P.O. Box 481, Centreville, AL 35042-0481, \$10.45.*

*USDA Livestock Guarding Dogs Protecting Sheep from Predators, Bulletin #588. Animal Damage Control, 61396 S. High 97, Bend, OR 97702.*

## On the road —

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at me and gave a toothless grin. "I hear you're interested in shearing sheep," he said. His smile was friendly and encouraging. "I'd be interested in trying it," I replied. "I like animals, and it doesn't look too hard when you do it."

The elderly shearer grinned a knowing grin. "It isn't too hard once you know how to shear." Little did I know what an understatement that was, but it would take me a few more months to find out for myself. Ruby told me the man's name was "Rowdy" Roy. She didn't know how he had come by the name, but it seemed to fit him. Ruby then pointed to the heavyset woman who was helping Roy to shear her sheep. "Her name is Lorie," Ruby

informed me.

I turned my attention to the large woman shearing on the left side of the huge carpet. She stood there in bare feet with a firm grip on the ewe in her grasp. Lorie's stringy hair hung into her face, and as she bent over the sheep, a crevice appeared just above the top of her pants. The strong language she used on the ewe made me realize that no ewe would escape from Lorie unshorn. Her brown toes curled to get a better hold on the carpet as she removed more of the wool from the sheep she was holding. An ear tag identifying the ewe flew off and disappeared into the manure and wool pieces around the carpet as Lorie maneuvered the clipper around the animal's ear.

"Rough" Roy grinned proudly up at the woman helping him. "I taught her everything she knows," he informed us proudly. I could see immediately that when I took up shearing, that I didn't want to imitate Lorie and her barn manner.

As I watch the two people in front of me removing the wool from the sheep, I decided that I could do that. With a small amount of struggle from the sheep, the wool seemed to fall effortlessly from the ewes. The shearing method that Roy and Lorie used began on the top of the head, worked down the neck and sides of the sheep. It was completed with the shearers lying on the sheep to shear the wool off around the tail. The fleeces lay in one fluffy piece on the carpeting as the shearers finished with each animal.

Roy spit the chewing tobacco juices toward the edge of the carpet in regular intervals, as he explained the shearing clippers they were using. They were old Stewart clippers. The blades screwed onto the clippers were two and a half inches wide. The motors on the clippers would get hot, but with Roy's two-handed shearing method it was no problem. You would place the clipper in the other hand before it became too uncomfortable. "These Stewart clippers are the best shearing machines ever made. None of the new clippers made can compare with these," Roy informed me with all the knowledge of his experience. I listened intently to every word, and since I knew nothing about sheep shearing, I figured I could learn a lot from this man. It was not until months after Roy's death that I would begin to question some of his long-held beliefs.

The time passed quickly, with most of us sipping on colas. Roy would make an occasional trip out to his pickup truck for "equipment." Even as his gait became more and more unsteady as the afternoon progressed, it still did not occur to me what he was getting from his truck.

As the last shorn sheep was released by the shearers, Roy and Lorie loaded the shearing equipment into the back of Roy's truck. The sheep seemed totally unconcerned by what had just been done to them and stood munching contentedly on the hay that was put out for them by Lester. Roy gave one more proud gaze at the shorn sheep as he and Lorie climbed into his new pickup. They began to roll slowly down the driveway amidst waves and thank yous. Roy turned to me and announced that he would give me a call to help him shear sheep as soon as he needed me.

## About the author

Bernie Lex will continue her "On the

Road" series of becoming a professional shearer. She shears around 8,000 head a year in Minnesota and Iowa and has won many contests. She lives in Buffalo, Minnesota.

## Onions—

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being alfalfa pellets. The dry matter also included either: 1) 50 percent whole sorghum, 2) 25 percent whole sorghum and 25 percent onions, or 3) 50 percent onions. We fed five animals each diet at a level to provide 3.5 percent of their body weight as dry matter.

Flow of fluid through the rumen was not affected greatly by onions, nor was retention time of feed particles (alfalfa) from the rumen. Measurements estimating the activity of microbes in the rumen supported these observations. Of these measurements only minor differences occurred. In summary, from these estimates we found no indication that onions affect ruminal digestion of forages any differently than sorghum. We did observe that onions reduced the digestion of alfalfa in the rumen, but the reduction was small.

From our studies, we feel that feeding onions to sheep can replace whole sorghum, and possibly other grains, as a component of the diet. This can be accomplished without sacrificing animal performance or injuring animal health. However, as with any feed some precautions are advised. First the onions we fed are typical of Southern New Mexico in that they are mild tasting, fresh market onions. Mild onions are low in sulfur compounds, while the more pungent onions are high in sulfur. Therefore, feeding smaller quantities of the more pungent onions, at least initially, is probably wise.

Second, most livestock deaths due to onion poisoning occur when animals in poor condition are fed onions, or when there is little other good feed available. Onions must be fed as part of a complete ration that contains a good source of protein, or to animals on good pasture. The onions we used contained between 8 to 9 percent crude protein on a dry matter basis, which is not adequate for a growing animal. Additional protein might also be required for detoxifying mechanisms that are responsible for removal of sulfur compounds from the body.

Lastly, sulfur interferes with copper and molybdenum absorption by forming insoluble complexes in the intestinal tract. Therefore, a mineral supplement with ample amounts of both copper and molybdenum should be available to animals fed onions.

By working with onion packers, and exercising a little caution, sheep producers can turn a vast amount of cull onions into a very cost effective source of feed. A situation that promises to benefit both the onion and sheep producer alike.

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