

# Pelleting Feed for Lambs

By Paul Luimes, Ph.D., College Professor

In 2012 we conducted a trial feeding three levels of dried distillers' grains with solubles (DDGS). For more information on that trial, please see the September 2013 issue of Ontario Sheep News. There were two main questions that came from that study. At the high levels of DDGS (30%) there was considerable sorting observed. We wondered if the extra cost of pelleting the diet would be outweighed by the lambs eating a more balanced ration. Another question we had was with respect to the crude protein levels we targeted. In order to have a reasonable amount of DDGS in the ration we needed to target higher CP levels than the Nutrient Requirements tables indicated our lambs would need. In order to be consistent across the treatments we targeted the same CP levels for the treatments that did not contain DDGS. This may have artificially affected the feed cost per pound of gain by increasing the cost of the soybean meal-based treatment higher than it would have been in a more realistic on-farm scenario.

For this trial we set up three rations (Table 1): low protein (with soybean meal), high protein (with soybean meal) and high protein (with DDGS). The low protein ration targeted the protein level requirement according to the Nutrient Requirement tables (0.375 lb of CP/d) whereas the high protein rations were equivalent to the 0% and 30% DDGS rations of the previous year (0.50 lb of CP/d). With this we hoped to be able to determine if the higher protein levels effected growth performance or feed cost per pound of gain. All three of these rations were offered either non-pelleted (whole grains, protein meal and premix) or pelleted form (all ground and pelleted). The only ingredient difference between the non-pelleted and pelleted rations was that the pelleted ration included 10% wheat (with corn being reduced by equal amount) in order to improve pellet integrity.

In order to get enough replicates (4 pens per treatment) we needed a total of 24 pens (2 forms x 3 diets x 4 pens) which meant we had to repeat the trial since we have 12 pens. Our first run occurred from January to April of 2013 and the second run occurred from September to December of 2013.

Despite some health challenges during the second run we were able to complete the trial. The ration analysis can be seen in Table 2. Feed intake and growth performance data are presented in Table 3. For both tables the data is presented as form (non-pelleted vs. pelleted) and content (low CP (soybean meal) vs. high CP (soybean meal) vs. high CP (DDGS)). Comparisons can be made within form or within content but cannot be compared across form and content.

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**TABLE 1. DIETARY TREATMENTS.**

	Low CP		High CP			
	0% DDGS		0% DDGS		30% DDGS	
	not pelleted	pelleted	not pelleted	pelleted	not pelleted	pelleted
Corn	32.2%	22.2%	25.5%	15.5%	25.5%	15.5%
Barley	28.0%	28.0%	21.35%	21.35%	21.35%	21.35%
Oats	28.0%	28.0%	21.35	21.35	21.35%	21.35%
Wheat		10.0%		10.0%		10.0%
SBM	3.0%	3.0%	10.0%	10.0%		
DDGS					30.0%	30.0%
Wheat shorts	7.0%	7.0%	20.0	20.0		
Premix	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Limestone	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
S/tonne	\$373.00	\$383.00	\$386.50	\$396.50	\$378.00	\$388.00

**TABLE 2. RATION ANALYSIS. <sup>1</sup>**

	Form		Content <sup>2</sup>		
	non-pelleted	pelleted	low CP (SBM)	high CP (SBM)	high CP (DDGS)
Dry matter	86.7% <sup>x</sup>	86.9% <sup>x</sup>	87.1% <sup>a</sup>	86.3% <sup>b</sup>	87.0% <sup>a</sup>
Crude protein	13.1% <sup>x</sup>	13.8% <sup>x</sup>	11.3% <sup>a</sup>	14.1% <sup>b</sup>	14.9% <sup>b</sup>
Total digestible nutrients	81.9% <sup>x</sup>	82.7% <sup>x</sup>	83.4% <sup>a</sup>	82.5% <sup>a</sup>	81.1% <sup>a</sup>
Calcium	0.56% <sup>x</sup>	0.55% <sup>x</sup>	0.50% <sup>a</sup>	0.58% <sup>a</sup>	0.59% <sup>a</sup>
Phosphorus	0.41% <sup>x</sup>	0.45% <sup>y</sup>	0.37% <sup>a</sup>	0.45% <sup>b</sup>	0.48% <sup>b</sup>
Calcium: Phosphorus	1.36 <sup>x</sup>	1.22 <sup>x</sup>	1.35 <sup>a</sup>	1.29 <sup>a</sup>	1.24 <sup>a</sup>

<sup>1</sup> Averages with different superscripts (Form: x vs. y and Content: a vs. b vs. c) are statistically different.  
<sup>2</sup> SBM = soybean meal

**TABLE 3. LAMB GROWTH PERFORMANCE, FEED USE AND COST. <sup>1</sup>**

	Form		Content <sup>2</sup>		
	non-pelleted	pelleted	low CP (SBM)	high CP (SBM)	high CP (DDGS)
Average daily feed intake (lb/d)	3.36 <sup>x</sup>	3.46 <sup>y</sup>	3.31 <sup>a</sup>	3.49 <sup>b</sup>	3.42 <sup>ab</sup>
Average daily gain (lb/d)	0.75 <sup>x</sup>	0.76 <sup>x</sup>	0.70 <sup>a</sup>	0.76 <sup>ab</sup>	0.82 <sup>b</sup>
Days to market <sup>3</sup>	60	59	64	60	55
Feed to gain ratio	5.07 <sup>x</sup>	5.03 <sup>x</sup>	5.32 <sup>a</sup>	5.15 <sup>a</sup>	4.67 <sup>b</sup>
Feed cost (\$/lb of gain)	\$0.81 <sup>x</sup>	\$0.82 <sup>x</sup>	\$0.84 <sup>a</sup>	\$0.85 <sup>a</sup>	\$0.75 <sup>b</sup>

<sup>1</sup> Averages with different superscripts (Form: x vs. y and Content: a vs. b vs. c) are statistically different.  
<sup>2</sup> SBM = soybean meal  
<sup>3</sup> Calculated based on 45 lb gain

Before discussing the data I want to give a few explanations. First, I priced all the rations based on purchasing all the ingredients from a feed company. If you can grow your own grains or buy commodity feed by-products cheaper you will

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do better than my average cost for the non-pelleted feed. Second, except for wheat, I used the same ingredients in the pelleted vs. non-pelleted rations. Having the wheat in is a normal expectation of pelleting in order to strengthen the pellet. Not incorporating other cheap by-products in the pelleted treatments would have artificially raised the cost of the pelleted treatments. What I wanted to determine mostly was how did the lambs perform with pelleted vs. non-pelleted, DDGS vs. SBM and low CP vs. high CP. Once we can accurately compare performance across these differences we can apply the principles learned and insert costs of other feeds and determine if they are economically feasible or not.

## Potential Value of Pelleting

There was an increase in feed intake seen when the lambs were fed pellets but this did not translate into faster gains or poorer feed to gain ratios. In swine the pelleting process has been shown to improve feed to gain ratios by around 10% but unfortunately we did not see this improvement with lambs. Given the diets I formulated, pelleting was the same cost as not pelleting on a cost per pound (or kg) of gain. Thus at a first glance there is no advantage or disadvantage to pelleting. There are other factors, however, that impact the potential value of pelleting. The first is bunk management. Lambs could not sort their feed so it was clear the lambs consumed the intended diet with every bite. Because we were doing a trial we removed and measured the refused feed each day but there is no compelling reason to do this commercially. Unless the pellet begins to fall apart (as can be the case with using a lot of fibrous feed by-products) or get wet, what is in the pellet is complete and available for consumption. As well, we limited the amount of each feed put into the bunk each day – 105% of the pen intake from the previous day. This was done so we could monitor feed intakes for the data collection. In a commercial setting one could, unless the feeders were subject to allowing wastage, put enough pellet in the feed bunks for a few days or even weeks at a time. If you were offering non-pelleted feed, especially the high DDGS diet, I would recommend you only feed enough for one day at a time to force the lambs to clean up the complete diet.

I cannot determine what the labour saving opportunity is for you on your farm but there are enough numbers in this article that you can do some calculations. For example, if by pelleting I can fill a hog feeder once every 4 days thereby cutting my labour from 20 minutes to 5 minutes per day to feed 100 lambs and I am pricing my labour at \$20/hr, the value of the pelleted feed (to break even at the same cost as not pelleting) is around \$32 more per tonne fed than non-pelleted feed.

## Value of DDGS

Once again feeding DDGS has been shown to be very cost effective. I did my cost analysis based on prices quoted to me at the beginning of the trial in January of 2013. Given those prices the cost savings due to feeding DDGS based on 45 pounds of gain is \$4.50 per lamb. A rough guide to determine the value of DDGS relative to other options is that a given amount of DDGS (for example “per pound” or “per tonne”) is worth 0.54 times the value of corn (per the same unit) plus 0.43 times the value of soybean meal (per the same unit). At the time of writing this article it is my understanding DDGS is valued at \$290/tonne while corn is \$185/tonne and soybean meal is \$620/tonne. This means that DDGS has a value (based on the equation above) of \$366.50/tonne so is a good value purchase. To give a comparison, at the present my calculations indicate, on a nutrient basis, that barley and oats have a value of around \$200/tonne. My sources tell me barley is in the ballpark of \$250/tonne and oats around \$350/tonne so right now they are a terrible value option for feeding lambs.





## Value of Higher Protein

One question that was asked of the DDGS trial we did in 2012 was whether it was fair to compare the 30% DDGS treatment we had to the soybean meal treatment (0% DDGS). The soybean meal treatment maintained the higher-than-requirements level of CP. The fair assertion was that I should have kept the soybean meal levels to the lower table requirements because higher levels would inflate the cost per pound of gain without any increased value. Before discussing that directly, I wish to clarify an important nutritional concept. A lamb (or any animal for that matter) does not require any percentage of any nutrient. A lamb requires an amount of a nutrient in order to maintain itself and attain a particular growth rate. As a simple example, if a lamb needs 0.40 lb of CP to grow 0.75 lb/d, it does not really matter if that CP is in 3 or 4 lb of feed so long as the lamb consumes it all and all other nutrient requirements are met. The percent CP of a diet that meets requirements for a lamb eating 3 lb/d would be 13.3% in our example and would be 10.0% if the lamb would eat 4 lb of feed/d.

Our low CP diet supplied 0.374 g of CP/d while our high CP soybean meal diet supplied 0.492 lb of CP/d. In terms of feed cost per pound of gain our low and high CP soybean meal diets were the same. My initial guess was that the correct amount of CP to supply our lambs was somewhere between our low and high CP diets but I must admit that I have no way of giving any firm defense of that hypothesis with my data. It is surprising to me that I can supply 0.374 lb of CP/d vs. 0.492 lb of CP/d (30% increase) to lambs and the feed cost per lb of gain is the same. I don't have enough data to tell you what CP intake level to target and I doubt most farms would have the capacity to know if what modifications they are making regarding this are actually resulting in cost-effective improvements. My best guess at this time is to tend higher than the requirement tables so that superior lambs have the protein required to reach closer to their genetic capacity. If you increase protein supply and growth rate does not improve, I would return to my lower protein supply. Nevertheless, I can discuss the specific question raised by whether our feeding higher levels of soybean meal than the Nutrient Requirement tables suggest unfairly increases the cost of feeding soybean meal when comparing to the DDGS diet – they didn't. Unfortunately the cost of doing a thorough job of determining protein requirements by experimentation would be immense so we have to work with what we currently have.

**Would I pellet my lamb feed? Yes I would... at least as long as DDGS has a better value than its cost. Depending on costs and my ability to grow grains on my farm I might just pellet the non-grain portion of the diet and feed it with whole grains. – Paul Luimes**



## Implications

Would I pellet my lamb feed? Yes I would...at least as long as DDGS has a better value than its cost. Depending on costs and my ability to grow grains on my farm I might just pellet the non-grain portion of the diet and feed it with whole grains. I would take the opportunity a pelleted feed offers me to automate/simplify my feeding and bunk management systems. So long as I had a good source of fresh water available I would tend toward a higher protein supply (0.45 to 0.50 lb of CP/d) to take advantage of the genetic growth potential of my best lambs.

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