

# Feed Substitution in Barbados Blackbelly Sheep Production:

## *Weaning the Industry off of Expensive Imports*

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### Summary

The encroachment of farm land in Barbados as a result of urbanization and the tourism industry, has led to the decline and over grazing of natural pastures for Barbados



Students Steph, Jackie and Cullen (left-to-right) examine data collected at Greenland Research Station

blackbelly sheep. The main alternative and/or supplement to grazing for sheep is the use of high-cost feed concentrates provided by Pinnacle Feeds, Ltd., the only source for livestock feed in Barbados.

There is a high demand for a stable, cheap and nutritious alternative food source for the sheep industry. The substitution of grain-based concentrates with readily available agro-industrial by-products is a viable solution. (Bekele et al. 2013).

### Objectives

The purpose of this study was to investigate alternative feeds in order to reduce the dependency of local farmers on imported feedstuffs. This is an important area of research in the production of ruminants in



order to reduce operational costs for farmers while sustaining the nutrition and health of the livestock and increasing their growth. To achieve this goal, we tested a mixture of inexpensive agricultural by-products fed to the sheep which was comprised of wheat middlings as the primary source of protein, and was supplemented by rice bran, soybean meal and molasses.

### Materials and Methods

The experiment consisted of: (a) the creation and preparation of a by-product feed drawn from local materials; (b) the feeding trial with three diets; and (c) sampling of the control and by-product components for biochemical analysis of their nutritional quality at McGill University.

#### *(a) Selection of ingredients for by-product feed recipe*

The new feed recipe was formulated to conform to the same standards as the current feed that the Greenland livestock research station purchases from Pinnacle Feeds Ltd., which contains a minimum guaranteed crude protein level of 16% and costs \$1.33/kg.

The by-products used in the new recipe include the following ingredients: wheat middlings, which costs \$0.75/Kg and contains 15% crude protein, rice bran, with a cost of \$1.40/Kg and a crude protein level of 14%, soybean meal, costing \$1.70/Kg with a crude protein level of 49%, and molasses, which costs \$1.00 per gallon and consists of 6% crude protein.

*(b) Feeding Trial*

The feeding trial involved the separation of our flock of twenty-five rams into the three treatments, with each treatment being replicated three times for a total of nine pens in which the sheep were housed. As a consequence of praedial larceny, there were only a total of eight rams in the control group and in treatment #2 (100% by-product), meaning that one pen of the three replicates for the two treatments contained two rams instead of three.

The sheep were weaned and de-wormed in the first week of the study and given a 2-week adjustment period where they were fed Pinnacle concentrate in order to overcome the stress of being weaned. For the 6 subsequent weeks of our experiment the sheep were on their respective feed treatments.

Every week on Mondays and Tuesdays we cleaned the pens and replenished the hay and water. On Mondays each ram was weighed, after which the by-product feed was mixed and both this diet and the diets

**Table 1: Treatment 2 – 100% by-product feed  
By-product feed composition, nutrient content, and cost**

Ingredients	Feed Content (%)	Protein (%)	Fiber (%)	Cost (\$/kg)
Wheat Middlings	65	9.75	7.15	0.49
Rice Bran	25	3.5	3.25	0.35
Molasses*	5	0.3	0	0.009
Soybean Meal	5	2.45	-	0.085
<b>TOTAL</b>	100	16	10.4	0.85

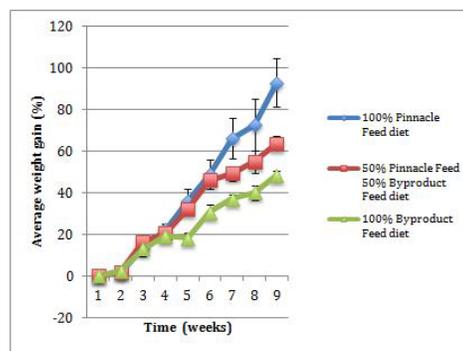
involving the Pinnacle concentrate were distributed to the required treatment pens.

*(c) Feed Sampling and Analysis*

Samples of wheat middlings, rice bran, soybean meal, molasses and Pinnacle lamb ration were collected and labeled for testing and sent to Dr. Arif Mustafa’s lab at McGill’s MacDonald campus where the dry samples were ground and the molasses was dried in preparation for analysis. Each ingredient was tested for percent protein content, percent fiber content, and total digestible nutrients (TDN).

**Results**

Figure 1: Average weight gain (%) as a function of time (weeks)



An analysis of the data concerning the average percent weight gain in each treatment group as a function of time, reveals a remarkably consistent rate of increase in weight among the sheep in treatment 1 (100% Pinnacle Feed diet) from week 2 to week 9. Conversely, the

weight of the sheep in treatment 2 (100% by-product feed diet) plateaus during the adjustment phase, between 3 and 5 weeks, finally rebounding between weeks 6 and 9. However, the rate of increase in this last period does not match that of the sheep in treatment 1. Finally, the sheep in treatment 3 (50/50 mixture) exhibited a fairly steady rate



Stephanie feeds the 50/50 mixture to blackbelly rams

of growth equivalent to that of the sheep in treatment one from week 2 to week 6, at which point the rate of the average percent weight gain decreases and struggles to regain its former vigor.

### **Conclusion & Recommendations**

Based on these results it can be said that the 100% Pinnacle feed was the most effective and consistent feed treatment. The 100% by-product feed is not a viable alternative to Pinnacle given that the weight gain was inconsistent and less desirable

compared to treatment one. The 50/50 mixture provided equivalent nutritional value much more cheaply for the first 6 weeks of our feeding trial, after which the benefits diminished. Thus, perhaps the 50/50 diet could be used during the first 6 weeks after weaning, reducing cost at a critical period in the process of raising blackbelly sheep. Alternatively, this trend could be due to the lack of freshness of the ingredients. Further research is required both to resolve the ambiguity of the conclusions drawn from this experiment, and also to determine the precise feed mixture to promote ideal sheep growth.

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