

Condensed Beet Solubles Product

feeding value compared with blackstrap molasses and barley in digestibility trials with lambs

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A condensed beet solubles product—MC-47—has a feeding value of approximately 82% that of blackstrap molasses when compared on a liquid basis.

Digestibility trials with lambs were undertaken to determine the digestibility of the condensed beet solubles product and its value as a livestock feed.

Since the results of feeding trials can not be applied to widely differing sets of conditions, the results of such trials are of limited value in comparing condensed beet solubles product—shortened, for convenience, to beet solubles—with feeds other than those used in the specific feeding trials. Digestion trials, however, provide a measure which can be used to compare directly one feed with any other upon which digestion trials have been conducted. The digestion coefficients obtained for the various nutrients in a feed make it possible to calculate the TDN—total digestible nutrients—and the DCP—digestible crude protein—of the feed in question. These two measures are used as standards in estimating the comparative value of feeds. Because of the importance of TDN and DCP in the evaluation of feeds and in the feeding of animals, trials were run to determine the content of these two measures in beet solubles.

The design of the experiment shown in the table below consisted of two replications of a 3 x 3 latin square involving six lambs and three rations. The design was so arranged that each lamb received each ration at some time during the experiment. Such a design makes it possible to compare the three rations on each of the lambs and to conduct 18 digestion trials with only six lambs. The three rations consisted of alfalfa hay alone, alfalfa hay plus 20% beet solubles and alfalfa hay plus 40% beet solubles.

Design of Experiment				
Replication No.	Period No.	Alfalfa, 100% beet solubles, 0%	Alfalfa, 80% beet solubles, 20%	Alfalfa, 60% beet solubles, 40%
		Lamb numbers		
I	1	4	6	7
	2	7	4	6
	3	6	7	4
II	1	8	9	10
	2	9	10	8
	3	10	8	9

During all trials the rations were fed for a preliminary period of at least seven days with the lambs being on a constant daily feed intake. This was followed by a second seven-day period during which the entire fecal excretion of each lamb was collected, weighed, sampled, and analyzed. From the data thus obtained, the digestibility of the three rations was determined. The digestibility of the crude protein—N x 6.25—of the entire ration is shown in the upper and the TDN content in the lower of the following two tables.

The Digestibility of Crude Protein in the Entire Ration

Lamb No.	Level of beet solubles fed, per cent		
	0	20	40
4	77.3	78.8	79.2
6	74.9	74.5	80.8
7	73.3	78.4	77.2
8	74.0	77.6	80.9
9	73.5	76.3	78.4
10	70.3	76.3	79.1
Means	73.9	77.0	79.3

The TDN Content of the Entire Ration

Lamb No.	Level of beet solubles fed, per cent		
	0	20	40
4	50.1	46.9	44.9
6	47.6	45.6	45.7
7	46.0	47.3	44.6
8	48.2	45.5	46.9
9	47.3	47.2	43.5
10	40.8	45.8	46.9
Means	46.7	46.4	45.4

It is apparent that as the percentage of beet solubles in the ration increased in these experiments, the percentage of TDN decreased slightly. This indicated that the TDN content of the beet solubles was slightly lower than that of the alfalfa hay.

Digestibility Calculated

Knowing the digestibility of alfalfa hay alone and alfalfa plus beet solubles, it was then possible to calculate the digestibility of the beet solubles by difference. The actual percentages of TDN and DCP in beet solubles as calculated by difference are shown in the table on top of the next column.

The Nutrient Content of Beet Solubles, as Fed

Lamb No.	TDN %	DCP %
4	45.0	17.3
6	42.7	15.9
7	45.6	16.7
8	44.0	17.2
9	44.0	16.1
10	44.7	16.6
Means	44.3	16.6

Thus, as fed, beet solubles contained an average of 44.3% TDN and 16.6% DCP.

Although beet solubles contain 16.6% DCP it should be emphasized that this is made up primarily of non-protein-nitrogen containing substances. The extent of the utilization of these substances under various conditions is not known. Studies are now under way to obtain information on this problem.

A comparison of these values for TDN with similar ones for other common feeds is shown in the following table:

Comparison of Beet Solubles with Other Feedstuffs, as Fed and on a Total Solids on Dry Basis

Feed	Total digestible nutrients	
	as fed %	dry basis %
Beet solubles	44.3	70.3
Molasses, blackstrap	54.0*	73.0*
Barley	78.7*	87.6*
Barley straw	42.2*	46.9*

* Taken from Feeds and Feeding by F. B. Morrison.

From these comparisons it can be calculated that on the liquid basis beet solubles is worth approximately 82% the value of molasses and 56% the value of barley as a source of TDN.

The solids of beet solubles, on the other hand, are worth approximately 96% the value of molasses solids and 80% the value of barley solids.

These comparisons support earlier observations that when compared on the solids basis, beet solubles and blackstrap molasses were of approximately equal value in fattening steers. They point out, however, that on the liquid basis—the way they are usually purchased and fed—beet solubles is worth 82% the value of blackstrap molasses as a source of TDN.

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