Abstract # T202

The effect of milling on physical material lost through dacron bags of 53 µ pore size

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Message

Feed samples milled through a 1 or 2 mm screen may contain particles small enough to pass through dacron bag pores resulting in an over estimation of the soluble fraction.

Introduction

Feed samples prepared for *in sacco* degradation trials are usually milled through a 1 or 2 mm screen before weighing out into dacron bags. Determination of the soluble fraction is based on disappearance of material from dacron bags following a water washing cycle. Very fine particles that can pass through the dacron bag pores may result in an over estimation of the soluble fraction. Two experiments were done to quantify potential fine particle losses and to characterize different particle size fractions of milled samples. Such information could be of value in the standardization of procedures.

Material and methods

Experiment 1: Samples of alfalfa hay and wheat straw, milled through a 1 mm screen, were sieved through a 60 µ stainless steel mesh. Material remaining on top of the mesh is referred to as course material (CM) and material that passed through the mesh is referred to as fine material (FM). Samples of CM, FM and unsieved material (UM) were analyzed for NDF and were also used in dacron bags (53 µ pore size) to determine DM losses into water during 5 x 1-minute washing cycles.

Experiment 2: The same procedure was followed as described in Experiment 1, except that *Eragrostis curvula* hay was included in the sample list and that material was sieved through a 250 µ screen.

Results

Results are presented in Table 1.

Separation of fine material with a 60 µ screen had a significant effect on NDF distribution. For both alfalfa hay and wheat straw, the fine fraction had the highest NDF content, while the course fraction had the lowest NDF content. The reason for this NDF distribution pattern is not readily apparent, but it is speculated that those plant particles containing the least NDF are more flexible (less brittle) than high cellulosic and lignified particles. The latter might be more inclined to splinter into extremely fine particles. Fine particle separation had a significant impact on the apparent soluble fraction. It is clear that extremely fine particles may be washed out of the bags resulting in an over estimation of the soluble fraction.

Separation of fine material with a 250 µ screen again had a significant effect on NDF distribution. However, in the case of the 250 µ separation, the course material had the highest NDF content for all three forages. In the case of wheat straw and *Eragrostis curvula* hay, the NDF content of the unsieved material was very similar to that of the other fractions, while for alfalfa hay, the difference was more substantial.

Fine particle separation with the 250 µ screen again had a significant effect on the apparent soluble fraction. As was the case in the 60 µ screening, the apparent soluble fraction of the fine material in the 250 µ screening was significantly higher than that of the course material and original sample. Apparent soluble fraction values were not as high as in the case of the 60 µ screening.

Conclusions

- Forage samples milled through a 1 or 2 mm sieve may contain a significant amount of extremely fine particles (<53 µ).
- When used in *in sacco* trials, such fine particles may pass through the dacron bag pores, resulting in an over estimation of the soluble fraction.
- Extremely fine particles can be removed by sieving milled samples through a fine screen.
- The current study demonstrated that the mesh size of fine particle separation screens appears to have an effect on the distribution of NDF in the resultant fractions. It would be imperative to find a mesh size that would result in an even distribution of nutrients in fine and course fractions.
- A mesh size of 250 µ appears to work well for forages such as wheat straw and *Eragrostis curvula* hay in terms of NDF distribution. For alfalfa hay, NDF content was the highest in the fine fraction when sieved through a <60 µ screen, but highest in the course fraction when sieved through a 250 µ screen. It is possible that a mesh size somewhere between 60 µ and 250 µ would result in an even distribution of NDF.
- More research is needed to establish standardized procedures regarding optimal mesh sizes that would remove extremely fine particles, but still result in and even distribution of nutrients in fine and course fractions, comparable to that in the original sample.

Table 1 Effect of fine particle separation on NDF distribution and apparent soluble fraction of forage samples

Item	Alfalfa hay			*P*	Wheat straw			*P*	*Eragrostis curvula*			*P*
	CM	FM	UM		CM	FM	UM		CM	FM	UM	
60 µ particle separation:												
NDF, % of DM	43.5^{a}	52.5^{b}	49.6^{c}	<.001	49.7^{a}	62.1^{b}	60.2^{c}	<.001	-	-	-	<.001
Apparent soluble fraction, % of DM	25.6^{a}	57.8^{b}	32.5^{c}	<.001	25.6^{a}	62.2^{b}	32.2^{c}	<.001	-	-	-	<.001
250 µ particle separation:												
Part of sample remaining on top, %												
NDF, % of DM	55.9^{a}	46.5^{b}	49.6^{c}	<.001	60.6^{a}	59.1^{b}	60.2^{ab}	<.005	81.4^{a}	78.1^{b}	79.5^{b}	<.001
Apparent soluble fraction, % of DM	23.2^{a}	40.4^{b}	32.5^{c}	<.001	27.1^{a}	34.1^{b}	32.2^{c}	<.001	4.1^{a}	10.3^{b}	8.2^{c}	<.001

^{A,b,c}For each forage, values with similar superscripts within rows did not differ

CM: Course material (Fraction remaning on top of screen; FM: Fine material (Fraction that passed through screen); UM: Unsieved material (Original sample milled through 1 mm)