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Liquid Products

Improving fibre digestion and resultant herd performance by correctly supplementing dairy TMR with 6-Carbon sugars.

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INTRODUCTION

Livestock farmers are aware of the importance of producing good quality forage. Research has shown (1) that 9 out of 10 dairy farmers see forage and better use of grass silage as playing central roles in the future of their business.

A lot of time and effort is put into producing high quality forage. This includes seed choice, fertiliser regime/herbicide use etc. along with good clamp management and the choice of additive (if one is to be used)

This all goes toward producing good quality winter forage. However less focus is placed on getting the most from the forage once it is being fed. This includes maximizing forage intake and improving forage digestion once it is consumed.

Over the last 20 years there has been a significant amount of data published (2,3,4,5) highlighting the benefits in terms of forage digestion (improving NDF & ADF breakdown) by supplementing the dairy diet with appropriate levels of 6-Carbon (sucrose) sugar. Research has highlighted that the best response if generated when sugar levels are between 6-7% in the overall ration.

Sugar has now moved from a product used primarily for palatability to a nutrient essential for the maintenance and efficiency of the rumen, which in turn helps the dairy producers profitability in these tough times (6)

Adding 6-Carbon sugars in the form of sucrose/molasses has been shown to:

- Increased overall dry matter intake (Table 1)
- Improve fibre digestion (Figure 1)
- Stimulate microbial protein synthesis (Table 2)

All of these factors have a major impact on milk production.

	No liquid feed	+ molasses based liquid feed	The effect
DMI (kg)	27.7	29.1	+1.4 kg (+5%)
Milk yield (lts)	41.2	43.1	+1.9lts (+4.6%)
Milk fat %	3.81	3.92	+0.11 (+3%)
Milk protein %	3.36	3.35	no effect
Milk fat yield (g/d)	1,550	1,680	+130g (+8.4%)
Milk protein yield (g/d)	1,360	1,450	+90g (+6.6%)
Sorting		25% less	25% reduction

Table 1.(7): The effect on animal performance of adding a molasses based liquid feed to the diet

	Silage Alone	Added Sucrose	Added Starch	Added Xylose	Added Lactose	Added Fructose
Rumen Ammonia Concentrate (average)	255	**157**	231	180	158	164
Microbial Protein Synthesis g/d	64	**93**	74	82	89	86

Table 2.(8) The effect on rumen ammonia concentration and microbial protein synthesis of adding various fermentable energy sources

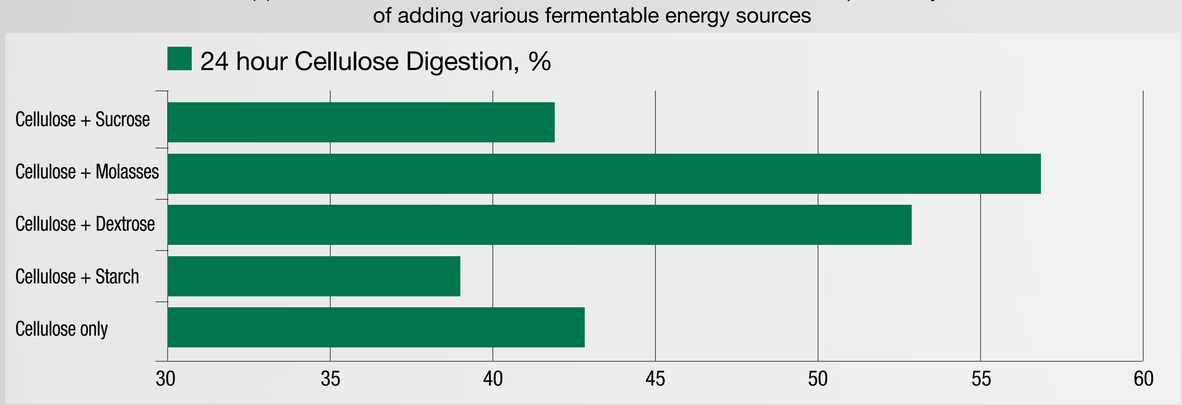

Figure 1 (9). The effect of different supplements of fibre digestion

THE EFFECT OF ADDING A HIGH 6-CARBON SUGAR MOLASSES BASED LIQUID FEED ON FIBRE DIGESTION IN LACTATING DAIRY COWS

METHODS

10 farms were selected for the trial. Average herd size was 180 milking cows with an average milk yield of 30kg/hd/day with 3.7% fat and 3.2% protein. Data was collected for 45 days before introducing the liquid feed and 45 days after. The liquid feed was manufactured at ED&F Mans Production site in Bologna. The cane molasses based liquid feed was 70% dry matter and 40% 6-Carbon sugars. The liquid feed was introduced into the ration over 7 days and was fixed at a feeding rate 1.5kg/hd/day throughout the 45 days of the feeding trial. No other dietary changes were made. On average the addition of the molasses based liquid feed increased the overall sugar content of the TMR from 3% to almost 6%. All rations were based in maize silage and hay.

TMR (NIR)	Pre	Post
Dry Matter	53,85	55,07
NDF %	35,85	35,66
ADF %	20,61	19,79
Crude protein %	14,55	14,37
Starch %	24,46	23,88
EE %	3,46	3,52
Ash %	6,71	7,03
Sugars %	3,04	5,94
TOTAL DMI:	22,6 kg	23,1 kg

Table 3. The average TMR analysis of the 10 trial herds pre and post the addition of the molasses based liquid feed

Throughout the whole 90 day period the following data was collected:-

- TMR composition using NIR.
- Herd milk production and milk composition
- Faeces analysis: Faeces samples were taken from 10 milking cows per herd. Mixed samples were:-
  a. passed through a series of sieves to separate the solid particles into small, medium and large
  b. sent for external NIR analysis at the University of Padova

RESULTS

The addition of the molasses based liquid feed was found to reduce the amount of fibre in the faeces both NDF and ADF and there was a change in the particle size distribution with a reduced percentage of large and medium particles found in the faeces following the introduction of the liquid feed and an increase in the small particles.

Average of 10 recorded herds	Pre liquid feed addition	Post liquid feed addition	Change
Faecal analysis			
Dry matter	13.54	13.06	-0.48
NDF %	**59.16**	**54.62**	**-4.54**
ADF %	**35.09**	**32.84**	**-2.25**
Crude protein %	14.74	14.99	0.25
Starch %	1.02	0.97	-0.05
EE %	5.06	4.56	-0.5
Ash %	11.95	12.03	0.08
Milk yield	**30.1**	**31.1**	**1.0**

Table 4. The effect of the addition of a molasses based liquid feed on average faecal composition and herd performance

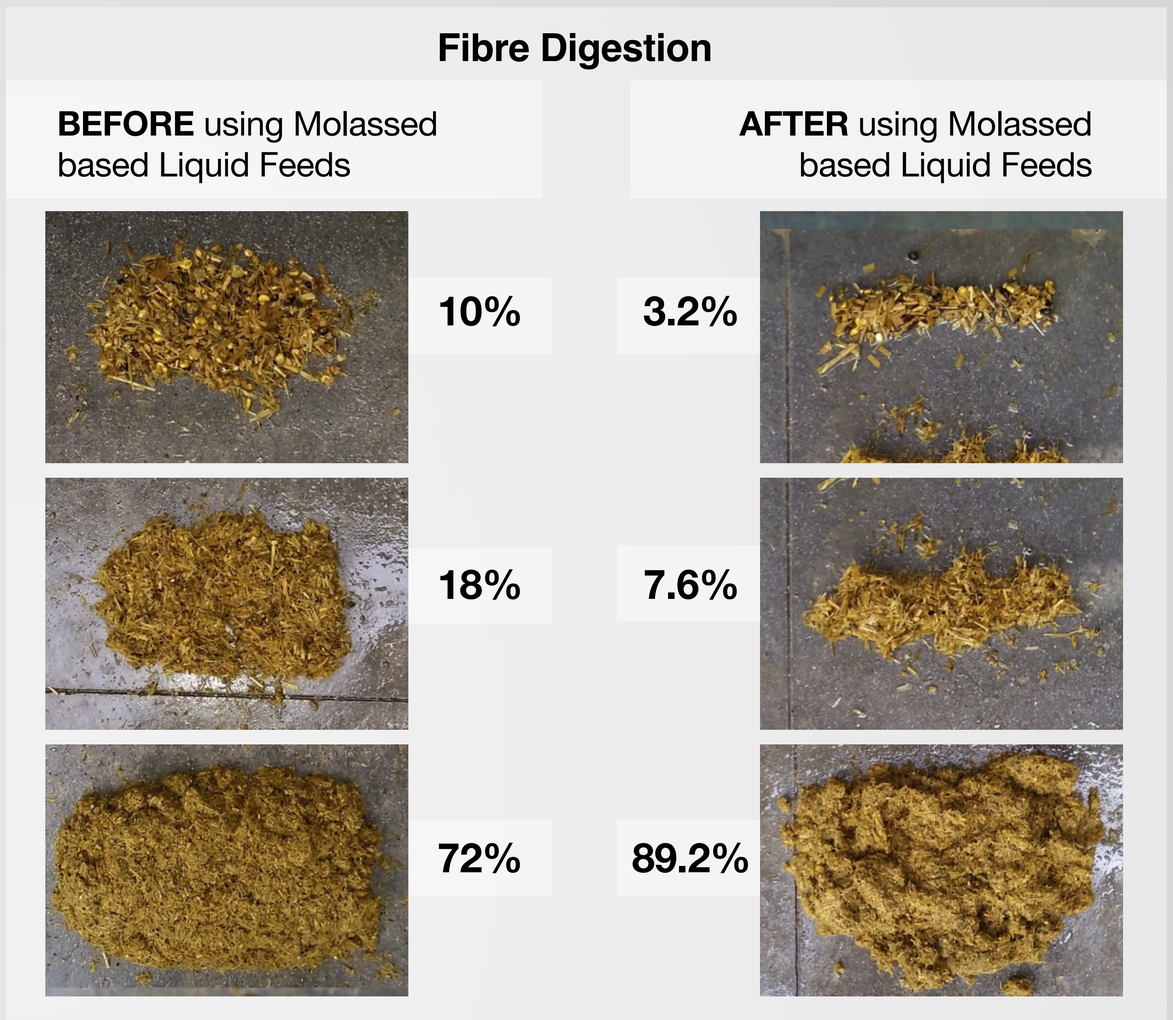

Figure 2. The effect of the addition of a molasses based liquid feed on faecal particle size distribution

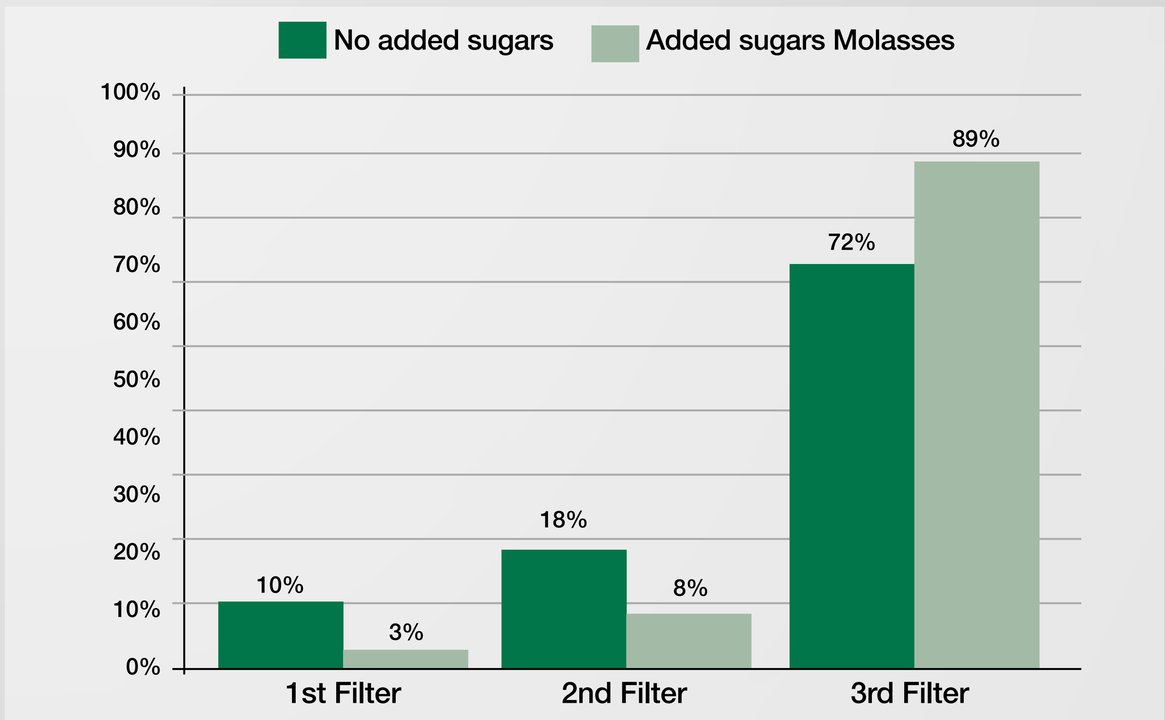

Figure 3. Graphical representation of the particle size distribution before and after the addition of a molasses based liquid feed

CONCLUSION

This work suggests that adding a high 6-Carbon sugar molasses based liquid feed to the diet, reduces the amount of undigested fibre found in the faeces and reduces the average particle size of the faeces. It can therefore be surmised that adding a molasses based liquid feed results in more fibre being digested by the animal and that there is an overall increase in the digestibility of the diet. An increase in milk yield was also observed. By increasing fibre digestion, it could result in more nutrients being extracted from the fibre component of the diet, which could result in improved performance and reduced reliance of more expensive purchased feeds, leading to more efficient and cost effective production.

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