



NIS Trial Report

For many 'high performing' ruminant diets, providing enough effective fibre to balance high starch levels, without depressing intakes is an all too common challenge.

With many facing such predicaments, Chestnutt Feeds conducted a month-long trial of Nutritionally Improved Straw (NIS) Pellets on the farm of a County Antrim dairy customer.

Milking in the region of 270 cows of predominantly Holstein breeding, the enterprise sought an alternative to their dwindling supply of hay, which had acted as the primary source of long fibre material in the winter ration.

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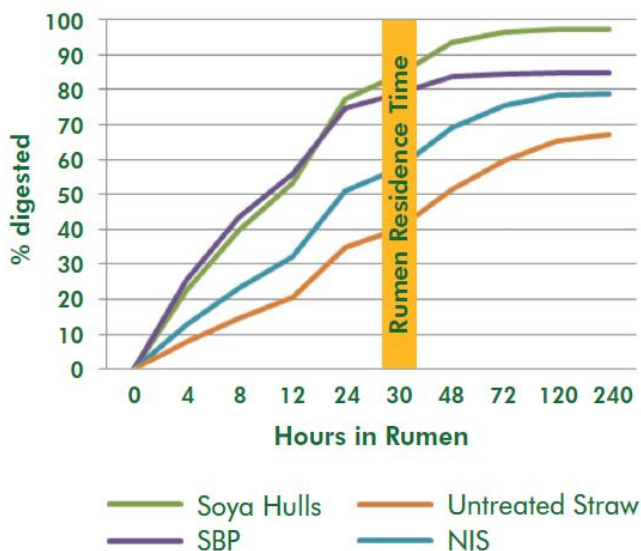
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About NIS

Manufactured by Sundown Products Ltd, NIS is a 6mm pellet derived from cereal straw and treated in an alkali solution to increase digestibility by up to 40%.



The palatable pellet is not only more digestible than its chopped straw counterpart but boasts double the energy content (7MJ/kgDM) and a buffering capacity equivalent to 1.5% of sodium bicarbonate.

While the pelleted form allows for ease of mixing and minimal sorting, its density vacates valuable room within the ration for other useful feed ingredients; whilst simultaneously enhancing dry matter intakes (DMI).

Its structure though short, doesn't hinder its effectiveness as a functional fibre source, with the pellet fragmenting into flakes, sufficient in length to contribute to the rumen's fibre mat.

With delivery from its Cambridgeshire plant, the product offers a consistent and available alternative to straw/hay for customers all year round.

Pre-Trial

Prior to commencing, a pre-trial assessment of forage, dung and milk was carried out for monitoring purposes.

At first glance the general condition of the herd was quite good, with animals' content and yields exceeding that of the previous year.

However, despite mixing 0.6kg/head of quality hay into the TMR, there were numerous indicators that the rumen fibre mat was potentially under strain; with high feed rates and lush silage key influencers.

Inconsistent dung scores, as seen below, ranging from 3.5 to as low as 1 were visible throughout; while milk components, especially butterfat had struggled to reach base level.



Trial Findings

Initially 0.6kg of hay was replaced with 1.45kg/head of NIS pellets. As the trial progressed, the level of inclusion was elevated to 1.5kg/head, in response to improved DMI.

Where a small amount of sorting may have been visible before, the NIS pellets mixed nicely through the TMR, resulting in a consistent feed, while reducing wagon mixing time and sorting at the feed fence.



The improvement in DMI was one of the stand out findings from the trial. At 20kgDM/head, intake levels for the 30-litre animal were reasonable prior to the introduction of NIS. However, within the space of a week DMI had reached 21.3kg, progressing on an upward trend throughout the trial; as seen in *Table 1*.

Table 1. An overview of dietary intakes for the 30-litre animal

	Quantity (kg)			
	14/01 (Before NIS)	21/01 (Week 1 of NIS)	04/02 (Week 3)	11/02 (Week 4)
First Cut Silage	15	19	18	18
Second Cut Silage	10	8	10	10
Wholecrop Silage	10	9.5	10	10
Blend	4.8	4.8	4.8	4.8
Dairy Nuts	4.5	4.5	4.5	4.5
Hay	0.6	-	-	-
NIS Pellets	-	1.45	1.5	1.5
FWT	44.9	47.25	48.8	48.8
DMI	20.0	21.3	21.5	22.65

* Figures for Week 2 not included due to herd being treated for fluke

As the trial proceeded, a correlation between increased DMI and improved milk components began to develop.

An upturn in intakes, availability of long fibres and more digestible fibres within the ration meant that butterfat was the main beneficiary in terms of components from the switch to NIS. Meanwhile, milk protein also seen an improvement as a result of the increased energy density of the diet.

Table 2. Herd average milk yield and components

	Yield (litres)	Butterfat (%)	Protein (%)	Lactose (%)
02/01	35	3.81	3.13	4.79
06/01	35	3.86	3.19	4.80
14/01	35	3.77	3.17	4.81
22/01 (First NIS recording)	35	3.89	3.20	4.78
05/02	35	3.96	3.21	4.79
13/02	35	3.96	3.22	4.79
19/02	35	3.97	3.21	4.81

Though milk components seen a great boost, milk yields remained constant throughout the trial, with increasing days in milk (DIM) potentially a factor. Another consideration is how additional energy made available from heightened intakes was partitioned within the animal.

With energy driving improvements in milk protein, it is also likely that the more energy dense NIS diet may have indirectly improved body condition gain and fertility; with the trial herd having experienced a very positive pregnancy scan following the projects conclusion.

Table 3. Average dung score and consistency

	14/01	30/01	11/02
Average Dung Score	2.59	2.89	2.93
Range	1 – 3.5	2 – 3.5	2.5 – 3.5

Continual assessment of the dung provided an indication of the balance of the diet and importantly the overall efficiency of digestion.



As can be seen in *Table 3*, dung score and especially consistency improved nicely following the introduction of NIS; with the additional functional fibre helping to slow down the rate of passage and fermentation in the rumen.

Financial Evaluation

The costings of the trial were based on hay purchased at £175/t and NIS at £200/t. Average yields from the parlour recording system and components from the creamery were then used to evaluate changes in production.

Table 4. Financial effect of NIS pellets on milk margins

	14/01 <i>(Before NIS)</i>	21/01 <i>(Week 1 of NIS)</i>	04/02 <i>(Week 3)</i>	11/02 <i>(Week 4)</i>
<i>Cost of feeding per head</i>	£2.49	£2.67	£2.68	£2.68
<i>Variation in cost relative to original diet</i>	-	+£0.18	+£0.19	+£0.19
<i>Average Yield (litres)</i>	35	35	35	35
<i>Cost per litre produced relative to feed</i>	£0.07114286	£0.0762857	£0.0765714	£0.0765714
<i>Value of milk yield (@27ppl)</i>	£9.45	£9.45	£9.45	£9.45
<i>Butterfat (%)</i>	3.77	3.89	3.96	3.96
<i>Value of Butterfat with base of 3.85% (0.022ppl)</i>	-0.176ppl	+0.088ppl	+0.242ppl	+0.242ppl
<i>Value of BF per cow</i>	-6.16p	+3.08p	+8.47p	+8.47p
<i>Protein (%)</i>	3.17	3.20	3.21	3.22
<i>Value of Protein with base of 3.18% (0.036ppl)</i>	-0.036ppl	+0.072ppl	+0.108ppl	+0.144ppl
<i>Value of P per cow</i>	- 1.26p	+2.52p	+3.78p	+5.04p
<i>Value of milk per cow</i>	£9.3758	£9.506	£9.5725	£9.5851
<i>Value of milk per cow less feed costs</i>	£6.8858	£6.836	£6.8925	£6.9051
<i>Difference relative to original diet</i>	-	- £0.0498	+ £0.0067	+ £0.0193

*Figures for Week 2 not included due to herd being treated for fluke

As can be seen in Table 4, replacing 0.6kg of hay with 1.45kg of NIS resulted in an additional cost £0.18/head; increasing to £0.19 as levels were heightened to 1.5kg from week three.

Despite the cost of producing a litre of milk rising, the additional expense of the NIS pellets was recuperated in week three of the trial, solely through milk quality bonuses.

Though the financial gain regarding milk production may have been fractional; indirect benefits linked to NIS such as improved rumen health, body condition score and fertility are all factors of significant economic importance.

Summary

In summary, from the data collected it is evident that the replacement of hay with Nutritionally Improved Straw Pellets enhanced both the performance and profitability of the trial herd.

Dung score & consistency, milk components and especially dry matter intakes were clear areas of progress; while factors such as body condition and fertility subsequently gained, however this has not been specifically trialled.

With many animals beyond the stage of peak production at the time of the trial (>100 DIM), it is likely that average days in milk restrained yields from responding to the improved dry matter intakes.

Therefore, if the NIS pellets were included in the diet from the start of lactation, a greater response in yield from fresher calved cows could be expected; which should positively impact performance in the later stages of lactation.

Though this trial was conducted in a 'high performance' housed environment, there is certainly potential for the NIS pellet to be incorporated into zero grazing, grazing and finisher systems where sorting or lack of functional fibre is a challenge.