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УДК 633.31;636.084:636.2

ALFALFA FEED USED IN THE DIETS OF RUMINANTS

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Annotation. *This article briefly discusses the importance of using different forms of alfalfa such as green, hay, haylage and silage as ruminant feed. The supplementation and inclusion of alfalfa to a poor basal diets and concentrates, and its significance in increasing the general performance of animals is briefly discussed.*

Key words: *Alfalfa, hay, haylage, silage, ruminants.*

Alfalfa (Latin. *Medicágo*) and other perennial legumes are valuable forage crops worldwide, as they are capable of producing high yields of high quality forage. Alfalfa is commonly used as animal feed because of its high crude protein content. It is used as animal feed in different ways: green, hay, haylage and silage. In modern animal husbandry forages are harvested at a stage of maximum yield and higher nutritional value and then they are preserved to supply continuously to the animals throughout the year. Alfalfa has a greater importance to ruminant feeding because of

its high yield of dry matter, protein and calcium content, good palatability and high feed intake levels with a well-balanced amino acid profile and provision of a higher concentrations of minerals and vitamins than other forage crops.

Many research findings have confirmed the importance of alfalfa feeding in increasing the performance of animals. Fresh alfalfa forage can substitute up to 50 % of a maize silage diet, enriching the diet with necessary protein and minerals, prevent metabolic disorders and minimize the use of concentrate feeds. A study in lambs fed different types of forages showed that alfalfa fed as a single diet led to a higher total dry matter intake (37.6g/ kg body weight per day) than birdsfoot trefoil (*Lotus corniculatus*) and sainfoin (*Onobrichis vicifolia*) forages 28.3, 33.7g/ kg body weight per day respectively, and also a higher nitrogen (N) intake was observed in lambs fed alfalfa, and similarly there was a higher tendency of the lamb preference of a feed offered when a forage is mixed with alfalfa than in the absence of alfalfa [3]. And other study reported that lambs grazing alfalfa has a significant higher daily intake than lambs grazing ryegrass.

A study in male Romane lambs confirms that lambs grazing alfalfa accumulate a higher levels of healthier fatty acid compositions (n-3 long-chain polyunsaturated fatty acids) in their muscle than lambs in stall-feeding with concentrate and grass hay, and vitamin E presence in alfalfa forage could also prevent muscle fatty acid quality deterioration and minimize oxidative damage of meat. Besides, other study has proved that lambs grazing green alfalfa forage improved conjugated linoleic acid, omega-3 fatty acids and α -tocopherol content in the meat of the lambs. Further study in intensive alfalfa feeding of goats has resulted in producing of goat meat with higher proportion of desirable fatty acids (oleic acid) for human diets than goats fed on commercial concentrate pellets.

According to Du et. al [1], fresh alfalfa has a higher effective ruminal degradability of NDF (50.9%) and ADF (41.1 %) than fresh clover 46.0 and 18.9 % respectively and also a higher ruminal degradation of dry matter was observed in fresh alfalfa (72.2 %) than fresh ryegrass (65.2 %), wheat straw (20.7 %), Corn straw (14.6 %) and corn cobs (6.0%) *in situ* degradation of rumen fistulated goats.

In a study by Sun et al. [5], fattening lambs fed a maize stover supplemented by alfalfa hay in a mixture of 40% maize stover and 60% alfalfa hay has increased the dry matter intake by 30% and forage conversion rate by 5% as compared to the lambs fed only maize stover and also improved the growth performance, carcass characteristics of the lambs such as carcass live weight and dressing percentage, and an increase of the net income.

According to Wang et al. [7], adult sheep fed corn straw with a supplement of alfalfa and concentrate showed that increasing alfalfa hay inclusion rates from 15% to 30% as a substitute for a portion of concentrate significantly decreased CH₄ emissions and urinary N and ammonium - nitrogen (NH₄ + -N) output significantly increased the intake of corn straw, non -structural detergent fibre (ADF). Inclusion of 15% alfalfa hay in the starter diet of young lambs has increased the muscularity of rumen wall of the lambs Alfalfa hay inclusion in lactating dairy cattle fed wet corn gluten feed-based diets has increased the dry matter

intake from 26.7 to 27.5 kg /day for inclusion rate from 0% to 21% alfalfa on a dry matter basis and has also increased the milk yield from 30.9 to 31.3 kg/day.

Wang et al. [6] reported that lactating dairy cows fed alfalfa hay had higher nutrient digestibility which results in a higher milk yield (23.5 kg/day), milk fat (0.98kg/day), milk protein (0.77kg/day), lactose (1.15 kg/day), and total solids (3.2kg/day) than cows fed corn stover and rice straw 19.4, 0.82, 0.62, 0.94, 2.61 and 20.8, 0.88, 0.65, 0.98, 2.76 kg/day respectively (Table).

Table

Performance of dairy cows fed experimental diets [6]

Yield, kg/d	Alfalfa hay	Corn stover	Rice straw	Standard error	P value
Milk	23,5	19,4	20,8	0,52	<0,01
Fat	0,98	0,82	0,88	0,025	<0,01
Protein	0,77	0,62	0,65	0,019	<0,01
Lactose	1,15	0,94	0,98	0,028	<0,01
Total milk solids	3,20	2,61	2,76	0,073	<0,01
N conversion*	25,1	20,4	21,6	0,54	<0,01

*N conversion = milk protein yield/Crude Protein intake.

It was observed that dairy cows fed alfalfa hay had significantly a higher dry matter intake (6.9 kg/day) and milk yield (10.4 kg/day) than cows fed diets containing groundnut haulms (*Arachis hypogaea*) (6.7 & 9.7 kg/day) or centrosema (*Centrosema pubescens*) hay (6.0 & 9.6 kg/day) respectively. Supplementation of alfalfa hay up to 25% of dry matter in starter diets of young Holstein male dairy calves has improved the calves performance with an increase of the total dry matter intake and average daily gain during the post weaning and overall periods. Moreover, inclusion of 19% alfalfa hay in the diets of finishing beef heifers has increased more the intake of dry matter and NDF than inclusion of 10% barley straw and has also reduced the risk of ruminal acidosis due to the longer rumination time of the heifers in inclusion of 19% alfalfa hay than 10% barley straw. According to Kobayashi et al. [2], the inclusion of alfalfa hay in concentrate-based diets offered to growing beef calves has increased the metabolizable-protein supply and nitrogen retention as the inclusion rate of alfalfa increased from 0% up to 38% of the total intake and the daily gain has also increased from 0.69 to 1.15kg/day. Inclusion of 10% alfalfa haylage in the diets of Angus-cross steers fed dried distillers grains has also increased the average daily gain by 5.7%.

Supplementation of alfalfa silage to perennial grasses tall fescue (*Schedonorus arundinacea* Schreb.) and timothy (*Phleum pratense* L.) silages fed to dairy cows has resulted in a higher dry matter intake (23.9 and 24.7 kg/day respectively) as compared to feeding only a tall fescue (22.6 kg/day) and timothy (22.6 kg/day) silage, and also observed a higher milk yield in adding alfalfa silage to the above two silages (28.0 and 28.6 kg/day respectively) than feeding only tall fescue (27.2 kg/day)

and timothy silage (26.1kg/day) [4]. Replacing timothy silage with alfalfa silage in the diets of dairy cows has also resulted in the increase of dry matter intake, crude protein (CP) digestibility and milk protein content.

Alfalfa is not only used in feeding ruminants but also it can be beneficial as a supplement feed in monogastric animals. A study in weaned piglets supplemented with Alfalfa polysaccharide have shown an increased performance in amylase and protease activities of the small intestine and morphological development of the gut and there was an increased growth rates and feed efficiency with encouraged beneficial microbial populations in the large intestine.

In conclusion, alfalfa has been used as the most important animal feed as green, hay, haylage and silage feed for long period of time especially for ruminants in increasing the intake, digestibility, body weight, milk production. In this article, alfalfa has been shown as the most promising forage used as green feed and its continuous usage as hay, haylage and silage and also as the best animal feed in solving the shortages and cost of animal feed in the world.

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