

DIET SELECTION IN FINISHING LAMBS

Mirko IVKOVIĆ, Jelena STANIVUK, Branko JAKOVLJEVIĆ, Siniša BJEDOV,
Dušan RAJKOVIĆ¹♦

Summary: In a total mixed ration (TMR) feeding system, lambs, as well as other animals, tend to exhibit dietary preferences. The purpose of this paper is to examine differences in the feed selection behavior between lambs previously accustomed to TMR feeding and lambs newly introduced to TMR diets.

A total of eight male Suffolk lambs were allocated to two groups of four each. Both groups received the same feed formulation. The roughage portion of the diet consisted of alfalfa hay, whereas the concentrate portion included a concentrate mixture for finishing lambs. One group of lambs was fed total mixed rations containing 30% alfalfa hay and 70% pelleted concentrate. The other group received alfalfa hay and concentrate rations separately as single diets. Diet selection measurements were performed after four weeks of the experimental feeding regime.

The results obtained indicate a clear preference of both groups for concentrate (112±5% and 110±6% respectively) over alfalfa hay (72±11% and 77±14% respectively). Significant differences were recorded in the duration of feeding time. The lambs accustomed to TMR feeding consumed 400 g of TMR for 18±1 minutes, whereas the lambs newly introduced to TMR diets required 154±88 minutes for the same allotment. Moreover, the lambs starting on a TMR diet were found to consume feed markedly slower, although their diet selection proved equally successful compared to the lambs accustomed to TMR feeding.

Key words: diet selection, Suffolk, lamb finishing.

INTRODUCTION

The feeding management of any domestic animal species emphasizes the importance of distinguishing between diets which are prescribed by animal nutritionists, formulated and offered to animals, consumed by animals, and ultimately digested by animals (Гламочић, 2002.). A multicomponent diet (concentrate, hay, silage, etc.) fosters diet selection, and animals are inclined to exhibit dietary preferences when fed total mixed rations containing a mixture of concentrates and roughages. The level of roughage in a ration greatly affects the diet selection of animals. Therefore, cows usually exhibit a clear preference for low-roughage diets (DeVries et al. 2007.).

The effect of dietary preference acquisition is a topical issue at present. Calves fed solely concentrate or hay rations in the first weeks of life tend to select the diet they grew accustomed to upon transitioning to mixed diets. However, after only four weeks of mixed diet feeding, all animals exhibited a preference for concentrate diets (Miller-Cushon and DeVries, 2011.). Conversely, Greter et al. (2010) argued that heifers fed total mixed rations show different feeding behavior patterns (namely feeding duration and frequency) relative to those fed roughage rations supplemented with concentrates, whereas the diet selection of both groups examined proved equally successful. In an experiment involving various levels of roughage in a diet, only a single day was needed for cows to adapt their dietary preferences to a new diet (DeVries et al. 2007.). Miller-Cushon et al. (2013) examined the effect of feeding total mixed rations to calves compared to single hay and concentrate diets. Their findings unequivocally demonstrate that an early introduction of differing single diets impedes the diet selection in the first weeks upon transitioning to mixed rations.

¹Mirko Ivković, PhD, Assistant Professor, Jelena Stanivuk, MS, Teaching Assistant, Branko Jakovljević, BS, Siniša Bjedov, PhD, Research Assistant, Dušan Rajković, MS, University of Novi Sad, Faculty of Agriculture, Trg D. Obradovića 8 21101 Novi Sad, Serbia.

♦Corresponding author: e-mail: rajkovicdusan@gmail.com

The purpose of this paper is to examine differences in the feed selection behavior between lambs previously accustomed to TMR feeding and lambs newly introduced to TMR diets.

MATERIAL AND METHODS

This research study was conducted to assess the influence of previous dietary habits of finishing lambs on their diet selection upon transitioning to the TMR feeding system. A total of eight male Suffolk lambs were randomly allocated to two groups of four. All the lambs were housed in individual pens, approximately 5 m² each and with wheat straw bedding. Barred fences separating the pens facilitated partial interactions between the animals. Both groups received the same feeds. The roughage portion of the diet consisted of alfalfa hay, whereas the concentrate portion included a concentrate mixture for finishing lambs. One group of lambs was fed total mixed rations containing 30% alfalfa hay and 70% pelleted concentrate. The hay offered was chopped into 20 mm lengths in order to obtain a better hay-concentrate mixture. The other group received alfalfa hay (in self-feeders) and concentrate rations separately. All the animals were given 24-hour access to feed and water.

Diet selection measurements were performed after four weeks of the experimental feeding regime. Feed was withheld from both groups for two hours, after which they were provided with a TMR diet containing 30% alfalfa hay and 70% pelleted concentrate. The feed selection of lambs was assessed by analysing the residual portion of feed. When the residual portion amounted to less than 100 g, the feeding was stopped and the feed residues were collected. The feed duration required was appropriately recorded.

The residues collected were manually separated into the following components: alfalfa stems, alfalfa leaves and concentrate. The ratio between stems and leaves in the alfalfa hay offered was determined in the same manner. Diet selection measurements were based on the actual intake of a specific feed component relative to the expected intake of that component under conditions of a complete lack of diet selection.

The relationship between the parameter values obtained was examined using the standard deviation and t-test.

RESULTS

The group of lambs accustomed to TMR feeding during the four weeks of the experiment indicated a clear preference for concentrate over alfalfa hay. Moreover, the actual concentrate intake in the group proved 8-18% higher than the expected concentrate intake. These findings are fairly consistent with the results obtained for the group newly introduced to TMR diets, showing the actual concentrate intake 1-16% higher than the expected concentrate intake. Although the average rate of concentrate selection was slightly higher in the group accustomed to TMR feeding, the *p*-values obtained using t-tests (Table 1) indicate a non-significant difference.

Table 1. The feeding duration and selection of concentrate, hay, alfalfa leaves and alfalfa stems according to previous dietary habits (%)

Previous dietary habits	concentrate		hay		alfalfa leaves		alfalfa stems		feeding duration	
	A ¹	NI ²	A	NI	A	NI	A	NI	A	NI
	108	101	58	63	55	46	54	62	17	33
	109	110	71	72	62	64	73	63	18	142
	112	112	80	77	69	96	82	91	19	220
	118	116	81	97	90	97	89	97	19	220
Mean	112	110	72	77	69	76	74	78	18	154
Standard deviation	5	6	11	14	15	25	15	18	1	88
<i>p</i> -value	0.62		0.62		0.68		0.77		0.02	

¹A-accustomed to total mixed ration; ²NI-newly introduced to total mixed ration

Both groups of animals tended not to select hay. Relative to the expected hay intake, the lambs previously accustomed to TMR feeding consumed 19-42% less hay, whereas the lambs newly introduced to TMR diets

consumed a total of 63-97% hay (3-37% less than expected). As in the instance of concentrate selection, a non-significant difference was also found between the groups with regard to hay selection.

In the group previously accustomed to TMR feeding, the intake of alfalfa leaves proved 10-45% less than expected. On average, a slighter tendency to avoid alfalfa leaves was determined in the group newly transitioning to TMR diets, however, with a great deal of variability. The intake of alfalfa leaves in this group was 3-54% less than expected. The difference between the groups regarding the intake of alfalfa leaves was also non-significant.

The intake of alfalfa stems in the group accustomed to TMR feeding was 11-46% less than expected, while the other group showed a slighter tendency to avoid alfalfa stems with a greater variability. The intake of alfalfa stems in the group newly introduced to TMR diets was 3-38% less than expected. Upon comparing Columns 2 and 4 of Table 1, the selection of alfalfa stems was completely consistent with the total hay selection.

Table 1 also shows the feeding duration of finishing lambs based on previous dietary habits. The parameter values obtained for feeding duration indicate significant differences between the groups. The lambs accustomed to TMR feeding consumed 400 g of TMR for 17-19 minutes, whereas the lambs newly introduced to TMR diets required 33-220 minutes for the same allotment. As displayed in Column 5 of Table 1, great differences were recorded in both the mean and standard deviation of this parameter.

DISCUSSION

This research showed a clear preference of both groups of lambs for concentrate over hay. Although it is not possible to make a direct comparison of the results obtained herein with those reported on the particle-size diet selection elsewhere in the literature, the issue studied is practically the same. Leonardi et al. (2005), Felton and DeVries, (2010), and Hosseinkhani et al. (2008) confirmed the preference of cows for fine over coarse particles. The fine particles examined mostly consisted of concentrate, and Miller-Cushon and DeVries (2011) therefore associated the selection of fine particles with the selection of concentrate. These authors further reported that the intake of fine particles in calves accustomed to TMR feeding was 20% higher than expected, which unequivocally demonstrates a clear preference of both lambs and calves for concentrate over hay.

A direct parallel can be drawn between the tendency of lambs not to select hay revealed in this study and the tendency of animals not to select coarse particle reported in previous studies (Leonardi et al. 2005, Felton and DeVries, 2010, Hosseinkhani, 2008). The results obtained herein confirmed no differences between the groups of lambs with regard to diet selection, which is consistent with the findings of DeVries et al. (2007). These authors argued that only a single day was necessary for cows to adapt their dietary preferences to a new diet, which proved even less in the instance of lambs starting on TMR feeding in this study.

Upon comparing the data in Table 1, it is noteworthy that the selection of alfalfa leaves was almost completely consistent with the total hay selection. Conversely, Owen and Wahed (1985), in an experiment involving sheep and goats fed solely alfalfa hay, found differences in the chemical composition of the feed offered and residues collected, indicating a preference of animals for leaves over stems. A similar experiment was conducted by Fedele (1996 cited Bonanno et al. 2008,) involving fresh alfalfa leaves and stems.

The results implying similar diet selections of animals regardless of their previous dietary habits, but considerable differences in the duration of feeding time, are in accordance with Hosseinkhani et al. (2008). These authors demonstrated that presence of competition affected the feeding duration of cows, although the diet selection behavior remained invariant. Their findings are congruent with those reported by Greter et al. (2010), who also confirmed that previous dietary habits exerted effects on feeding behavior patterns of heifers (feeding duration), whereas the diet selection behavior proved unaffected.

CONCLUSION

This experimental study enrolled a total of eight male finishing lambs of the Suffolk breed, which were randomly allocated to two groups of four each and fed the same feed formulation. One group of lambs received a diet of 30% alfalfa hay, chopped into 20 mm lengths and mixed with concentrate, whereas the other group received alfalfa hay and concentrate rations separately as single diets.

The results obtained indicate that both groups exhibited a clear preference for concentrate ((112±5% and 110±6% respectively) over hay (72±11% and 77±14% respectively). Significant differences were recorded in the duration of feeding time. The lambs accustomed to TMR feeding consumed 400 g of TMR for 18±1 minutes, whereas the lambs newly introduced to TMR diets required 154±88 minutes for the same allotment.

Animal dietary preferences can be innate, acquired by experience and acquired by interaction with other animals. The results obtained herein demonstrate the inborn ability of lambs to select diets upon their first introduction to TMR feeding.

REFERENCES

- GLAMOČIĆ D: The feeding of ruminants - Practicum. Faculty of Agriculture, Novi Sad, Novi Sad, 2002.
- BONANNO A, FEDELE V, DI GRIGOLI A: Grazing management of dairy goats on Mediterranean herbaceous pastures. Dairy goats feeding and nutrition, 189-220, 2008.
- DEVRIES TJ, BEAUCHEMIN KA, VON KEYSERLINGK MAG: Dietary forage concentration affect the feed sorting behavior of lactating dairy cows. Journal of Dairy Science, 90: 5572-5579, 2007.
- FELTON CA, DEVRIES TJ: Effect of water addition to a total mixed ration on feed temperature, feed intake, sorting behavior, and milk production of dairy cows. Journal of Dairy Science 93: 2651-2660, 2010.
- GRETER AM, LESLIE KE, MASON GJ, MCBRIDE BW, DEVRIES TJ: Feed delivery method affects the learning of feeding and competitive behavior in dairy heifers. Journal of Dairy Science 93: 3730-3737, 2010.
- HOSSEINKHANI A, DEVRIES TJ, PROUDFOOT KL, VALIZADEH R, VEIRA DM, VON KEYSERLINGK MAG: The effect of feed bunk competition on the feed sorting behavior of close up dry cows. Journal of Dairy Science 91: 1115-1121, 2008.
- LEONARDI C, GIANNICO F, ARMENTANO LE: Effect of water addition on selective consumption (sorting) of dry diets by dairy cattle. Journal of Dairy Science 88: 1043-1049, 2005.
- MILLER-CUSHON EK, DEVRIES TJ: Effect of early feed type exposure on diet-selecting behavior of dairy calves. Journal of Dairy Science 94: 342-350, 2011.
- MILLER-CUSHON EK, BERGERON R, LESLIE KE, MASON GJ, DEVRIES TJ: Effect of early exposure to different feed presentations on feed sorting of dairy calves. Journal of Dairy Science 96: 4624-4633, 2013.
- OWEN E, WAHED R: Comparison of sheep and goats under stall-feeding conditions: roughage intake and feed selection. Annales de zootechnie 34(4): 472-472, 1985.

BIRANJE HRANE KOD JAGNJADI U TOVU

Mirko IVKOVIĆ, Jelena STANIVUK, Branko JAKOVLJEVIĆ, Siniša BJEDOV, Dušan RAJKOVIĆ

Izvod: Pri ishrani životinja kompletno mešanim obrocima jagnjad, kao i druge životinje, biraju hranu. U ovom radu smo ispitivali da li se jagnjad koja su prethodno naviknuta na kompletno mešane obroke i jagnjad koja se prvi put susreću s njima pokazuju isto ponašanje u pogledu biranja hrane.

Osmoro muške jagnjadi safolk rase je podeljeno u dve grupe po četiri. Obe grupe jagnjadi su hranjene istim hranivima. Kao kabasto hranivo je korišćeno seno lucerke, a kao koncentrovano komercijalna potpuna smeša za ishranu jagnjadi u tovu. Prva grupa jagnjadi hranjena je kompletno mešanim obrocima sastavljenim od 30% sena i 70% peletiranog koncentrata. Druga grupa jagnjadi je dobila seno i koncentrat odvojeno. Nakon četiri nedelje obavljeno je merenje biranja hrane.

Došlo se do rezultata koji pokazuju, da su i jedni i drugi podjednako birali hranu u korist koncentrata ($112 \pm 5\%$ i $110 \pm 6\%$), a izbegavajući seno ($72 \pm 11\%$ i $77 \pm 14\%$). Ono po čemu su se bitno razlikovali je bilo vreme konzumacije. Jagnjad naviknuta na mešane obroke, pojeli su 400 grama mešanog obroka za 18 ± 1 minut, dok je jagnjadima koja su prvi put susrela sa ovakvim obrocima trebalo čak 154 ± 88 minuta.

Zaključak je da jagnjad koja se prvi put susreću sa kompletno mešanim obrokom jedu signifikantno sporije, ali jednako dobro biraju hranu, u odnosu na jagnjad koja već duži period jedu takav obrok.

Ključne reči: biranje hrane, safolk, jagnjad u tovu.

Received / Primljen: 28.12.2017.

Accepted / Prihvaćen: 19.06.2018.