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Conference paper

RELATIONSHIP BETWEEN BCS, METABOLIC PROFILE AND MILK QUANTITY AND QUALITY IN GOATS BROWSING A MEDITERRANEAN SHRUBLAND

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Introduction

Studies of grazing animals so far give only an estimation of the quantity of food ingested; on the other hand, it is difficult to know the actual intake of each nutrient in order to strike a balance between daily inputs and animal requirements. The measurement of some hematological parameter can help in detecting conditions of nutritional disorder or metabolic imbalance before the appearence of reduced productive or reproductive performance. The objective of this study was to evaluate on grazing goats the trend of some hematological parameter in relation to milk production and body condition score (BCS).

Material and methods

The study was carried out on three goat herds (A, B, and C), each consisting of 150 goats on average, featured by a late kidding season (February-March). Feeding consisted of browsing typical Mediterranean shrubland. Eighteen goats of the same age and parity were selected from each herd after weaning and submined to the experimental measurements. Every 20 days the BCS was measured (Santucci, 1984); on the same dates, milk quantity and quality were assessed and blood samples were taken from the jugular vein in the morning, before goats were allowed to graze. The samples were assayed for: glucose (GLU), cholesterol (CHO), triglicerids (TG), urea (BU), Ca, Pe Mg using a COBAS MIRA-PLUS ROCHE instrument. Milk was

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analysed for assessing contents of fat, protein, lactose (Milko-Scan) and urea (MU). Data were analysed by a GLM model including, herd, record number and their interaction as fixed effects. Means were compared by t test. Only comparisons between record numbers will be detailed in this report.

Results and discussion

The trend of BCS (fig. 1 and tab. 1) shows a steady increase which could be due probably to the improvement of the energy balance throughout lactation as already found by Branca and Casu (1989) in Sardinian goats reared in an extensive system. This finding is supported by the trend of milk production (fig. 2 and tab. 1), which can be considered high for unsupplemented animals. The highest milk production (ns. fig. 2) was found in the herd C that was featured by the the highest average BCS ($P<0.05$, fig. 1). This result is in accordance with the findings of Branca and Casu (1989). A negative correlation (-0.33, $P<0.0001$) was found between GLU (tab. 2) and milk quantity. A negative correlation though not very strong (-0.24, $P<0.001$) was also found between BCS and milk quantity. The improving nutritional condition of the goats, already outlined, was also evidenced by the trend of GLU, which shows a positive energy balance, cuncurrent with the increase in BCS (table 2). Triglicerids follow the same trend as glucose and BCS which explains the good correlation (0.48, $P<0.0001$) between BCS and TG. Cholesterol follows the same trend as TG. The increase of CHO could be due to the high level of circolating lipids which, in turn, require high levels of lipoproteins for being transferred to the different body tissues. Lipoproteins rich in cholesterol and phospholipids carry glicerids from the liver to the gut and other organs and tissues; this could explain the good correlation between CHO and TG (0.39, $P<0.0001$). High values of urea give strength to both hypotheses of a high level of NPN and sotuble-degradable protein in the diet, and, on the other hand, to the high goat capacity in nitrogen recycling (Brun-Bellut et al. 1981). Values of BU were higher than MU, particularly in the last control. Levels of BU and MU were highly correlated (0.60, $P<0.0001$), due to free diffusion of urea through the mammalian epithelium. Only Phosphorus (table 2), among the considered minerals, changed little throughout the study. Ca and Mg showed a tendency to increase in the last controls, as alredy reported (Pasquini et al. 1991). The levels of the minerals in our study were within the standard range apart from Mg which showed higher values (Pasquini et al. 1991).

Table 1. – LEAST SQUARE MEANS AND SEM OF BCS, MILK YIELD AND MILK COMPOSITION

No of record	BCS	Milk yield l/d	Fat %	Protein %	Lactose %	MU mmoli/l
I	2.51a	-	-	3.64c	4.55a	5.40a
II	2.48a	1.27c	4.72b	3.38b	4.71b	5.41a
III	2.63b	1.51d	4.31a	3.33ab	4.65 b	5.71a
IV	2.76c	1.41cd	4.39a	3.26a	4.65b	6.94b
V	2.97d	1.01b	4.23a	3.85d	4.65b	5.33a
VI	3.04d	0.78a	4.68b	3.25a	4.81c	5.27 a
SEM	0.03	0.05	0.14	0.04	0.03	0.3

Means with different letters within column ar significantly different (<0.05)

Table 2. – LEAST SQUARE MEANS AND SEM OF HEMATOLOGICAL PARAMETERS (MMOLI/I)

No of record	GLU	CHO	TG	BU	Ca	P	Mg
I	2.51a	1.65a	0.22a	5.87a	2.42a	1.86c	1.02a
II	2.52a	1.55a	0.21a	6.34ab	2.63ab	1.46a	1.01a
III	2.50a	1.61a	0.22a	6.67ab	2.67ab	1.80bc	0.98a
IV	2.68b	2.12b	0.33b	7.01b	2.41a	1.67b	1.04a
V	2.81bc	2.43c	0.43c	6.38ab	3.00b	1.58ab	1.29b
VI	2.90c	2.33c	0.67d	8.07c	2.88ab	1.71bc	1.43c
SEM	0.06	0.06	0.02	0.23	0.19	0.06	0.02

Means with different letters within column are significantly different (<0.05)

Fig. 1 – BCS EVOLUTION IN THREE GOAT HERDS

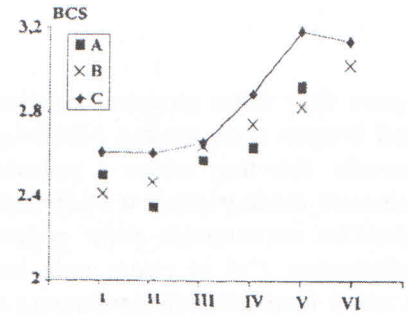
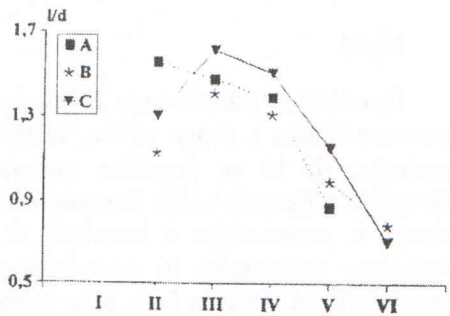


Fig. 2. – MILK YIELD EVOLUTION IN THREE GOAT HERDS



Conclusions

The results of the present study confirm the interest to combine BCS assessment with some haematological parameter in order to improve grazing animal nutrition. In particular glucose, cholesterol and triglicerids are confirmed as valuable indicators of goat energy balance. Both blood and milk urea levels give strenght to the hypothesis that, under the conditions of the present study, the goats experienced a high level of NPN and soluble-degradable protein in their diet. According to the results of blood assays, macro-mineral nutriton was satisfactory throughout lactation.

REFERENCES

1. Branca, A., S. Casu (1989): Body condition score annual evolution and its relationship with body reserves in Sarda goat. In: "L'évaluation des ovins et des caprins mediterranéens", (Flamant J. C. and P. Morand-Fehr Eds.) Rapport EUR 11893, OPOCE (Luxembourg), pp. 221-236.
2. Brun-Bellut, J., G. Blanchart, B. Vignon (1981): Utilisation des bilans pour determiner les besoins azotes de la chèvre en debut de lactation. Symposium nutrition et systemes d'alimentation de la chèvre. Tours 12-15 Mai 1981 pp. 153-159.
3. Pasquini, M., M. Serrantoni, A. Ciceri, G. Biagi, A.Valentini, M. Corti, G. F. Greppi (1991): Studio dei valori ematici di riferimento della capra da latte. Atti della Federazione Mediterranea di Sanità e Produzione dei ruminanti. Alghero 2- 3 Maggio.
4. Santucci, P. (1984): Essai de mise au point du mèthode d'estimation del' ètat corporel d'engraissement de chèvres corses. Sèminaire FAO sur la Nutrition et l'Alimentation des caprins, Grangeneuve (Suisse) 16-18 Octobre 1984.

ODNOS IZMEĐU BCS, METABOLIČKOG PROFILA I KOLIČINE KAKVOĆE MLIJEKA KOZA KOJE BRSTE MEDITERANSKU ŠIKARU

Uvod

Dosadašnja proučavanja životinja koje pasu daju samo procjenu količine unesene hrane; s druge strane, teško je znati stvaran unos svakog hranjivog sastojka, da bi se pogodila ravnoteža između dnevnog unosa i potreba životinje. Mjerenje nekih hematoloških parametara može pomoći u otkrivanju stanja u poremećaju u hranidbi ili metaboličke neravnoteže prije pojave smanjene proizvodne ili reproduktivne performance. Cilj je ovom rada bio procijeniti na kozama koje pasu tendenciju nekih hematoloških parametara u odnosu na proizvodnju mlijeka i rezultata tjelesne kondicije (BCS).

Materijal i metode

Istraživanja su provedena u tri stada koza (A, B i C) od kojih se svako sastojalo od prosječno 150 koza kasnog razdoblja jarenja (veljača-ožujak). Hranjenje se sastojalo od brstenja tipične mediteranske šikare. Izabrano je osamnaest koza iste dobi i sličnosti iz svakog stada nakon odbijanja i podvrgnuto pokusnim mjerenjima.

Svakih 20 dana mjeren je BCS (Santucci 1984.); istih datuma mjerena je količina i kakvoća mlijeka te uzeti uzorci krvi iz vratne vene u jutro, prije nego je kozama dozvoljeno pasti. Uzorci su testirani na glukozu (GLU), kolesterol (CHO), trigliceride (TG), ureu (BU), Ca, Pe Mg pomoću instrumenta COBAS MIRA-PLUS ROCHE.

Mlijeko je analizirano radi utvrđivanja sadržaja masti, bjelančevina, laktoze (Milko-Scan) i ureje (MU).

Podaci su analizirani pomoću modela GLM uključujući stado, registarski broj, i njihovu interakciju kao stalno djelovanje. Postupak je usporeden t-testom. U ovom ćemo radu detaljno obraditi samo usporedbe između registriranih brojeva.

Rezultati i diskusija

Tendencija BCSa (Sl. 1 i Tabl. l) pokazuje stalno povećanje, što bi vjerojatno moglo biti posljedica poboljšanja ravnoteže energije za vrijeme laktacije, a to su već našli Branca i Casu (1989.) u sardinijskih koza uzgojenih u ekstenzivnom držanju. Ovaj nalaz podupire proizvodnja mlijeka (Sl. 2, Tabl. 1), što se može smatrati visokom za životinje bez dodataka (hrani). Najveća proizvodnja mlijeka nađena je (S1. 2) u stadu C koje je imalo najviši prosječni BCS ($P<0,05$ Sl. 1). Taj rezultat odgovara nalazima Branca i Casu (1989.). Negativna korelacija (-0,33, $P<0,0001$) nađena je između LU (Tabl. 2) i količine mlijeka. Negativna korelacija, iako ne vrlo velika (-0,24, $P<0,001$) također je nađena između BCS i količine mlijeka. Poboljšano hranidbeno stanje koza, kako je već istaknuto, također je dokazano tendencijom GLU, što pokazuje pozitivnu ravnotežu energije istovremeno s povećanjem u BCS (Tabl. 2). Trigliceridi slijede istu tendenciju kao glukoza i BCS, što objašnjava dobru korelaciju (0,48, $P<0,0001$) između BCS i TG. Kolesterol slijedi istu tendenciju kao TG. Povećanje CHO može biti zbog visoke razine kružećih lipida koji pak traže visoku razine lipoproteina za prijenos u razna tjelesna tkiva. Lipoproteini bogati kolesterolom i fosfolipidima prenose gliceride iz jetara u crijevo i druge organe i tkiva; time se može protumačiti dobra korelacija između CHO i TG (0,39, $P<0,0001$). Visoke vrijednosti ureje podržavaju obje hipoteze visoke razine NPN i topivih i razgradivih

bjelančevina u hrani i s druge strane velika sposobnost koza za recikliranje dušika (Brun-Bellut et al., 1981.) Vrijednosti BU bile su više od MU, osobito u zadnjoj kontroli. Razine BU i su visoko korelativne (0,60, P<0,0001) zbog slobodne difuzije ureje kroz epitel sisavaca. Među razmatranim mineralima samo se fosfor (Tabl. 2) malo promijenio u tijeku istraživanja. Ca i Mg imali su tendenciju porasta u zadnjim kontrolama, kao što je već navedeno (Pasquini et al., 1991.). Razine minerala u našem istraživanju bile su u okvirima standardnog raspona, osim Mg koji je pokazao više vrijednosti (Pasquini et al., 1991.).

Zaključci

Rezultati ovog rada potvrđuju zanimanje povezivanja procjene BCS s nekim hematološkim parametrom radi poboljšanja životinja koje pasu. Potvrđeno je da su osobito glukoza, kolesterol i trigliceridi vrijedni pokazatelji ravnoteže energije u koza. Razine ureje u krvi i mlijeku potvrđuju hipotezu da su u uvjetima ovoga rada koze imale visoku razinu NPNa i topivih razgradivih bjelančevina u svojoj prehrani. U skladu s rezultatima krvnih testova makromineralna prehrana zadovoljavala je čitavo vrijeme laktacije.

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