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# Evaluation of in-farm versus weather station data for use as heat stress indicator in dairy sheep

R. Finocchiaro <sup>1</sup>, A. Di Grigoli <sup>1</sup>, J.B.C.H.M. van Kaam <sup>2</sup>,  
A. Bonanno <sup>1</sup>, B. Portolano <sup>1</sup>

<sup>1</sup> Dipartimento Scienze Entomologiche, Fitopatologiche, Microbiologiche e Zootecniche, Università di Palermo, Italy

<sup>2</sup> Istituto Zooprofilattico Sperimentale della Sicilia "A. Mirri", Palermo, Italy

*Corresponding author:* Raffaella Finocchiaro. Dipartimento Scienze Entomologiche, Fitopatologiche, Microbiologiche e Zootecniche, Sezione Produzioni Animali. Viale delle Scienze 13, 90128 Palermo, Italy – Tel: +39 091 7028869 – Fax: +39 091 7028873 - Email: rfino@unipa.it

## ABSTRACT

Heat stress is a limiting factor in dairy production in hot climates impairing growth, milk production and reproduction. The most widely investigated climatic factors related with heat stress are: air temperature and relative humidity. Previously dairy sheep studies of heat tolerance depended on measurements of physiological functions on individual animals such as rectal temperatures, respiration rates or volumes of air inhaled; unfortunately, such measurements are costly and not feasible on a large scale. This study aims to evaluate in-farm (IF) *versus* weather station (WS) data to be used as heat stress indicator in dairy sheep. Data were collected in three farms in November 2002 till July 2003. Maximum temperature (T) and relative humidity (RH) were monitored by means of thermo-hygrographs placed in the farms at a height of 1.5m above the ground. Both IF and WS data were taken 24 h before milk recording. The data contained 1,059 test-day records belonging to 275 Valle del Belice ewes. The correlation of WS-T with IF-T was 0.83 and with IF-RH was -0.70. The correlation of WS-RH with IF-T was -0.77 and with IF-RH was 0.78. The correlation of milk production with WS-T was -0.49, with WS-RH 0.46, with IF-T -0.50 and with IF-RH 0.30. GLM analyses undertaken were based on models that included fixed effects of flock, DIM, and T×RH or Temperature-humidity index (THI). This resulted in a decrease of milk production of -49.7 g per unit increase of T×RH if IF data were used *versus* a decrease of -36.6 g per unit increase T×RH if WS information were used. However when using the THI with IF climatic information there was a decrease of -35.0 g per unit increase of THI *versus* -44.8 g using WS data. By comparing the models, using the R<sup>2</sup> and root MSE, these were always slightly better when using WS rather than IF information, especially with THI. Therefore it seems that the use of weather stations might replace the IF collection.

# Observation on gastrointestinal strongylosis resistance in Zerasca breed

L. Giuliotti, M.N. Benvenuti, J. Goracci, P. Verità

Dipartimento Produzioni Animali, Università di Pisa, Italy

*Corresponding author:* Lorella Giuliotti. Dipartimento Produzioni Animali. Viale delle Piagge 2, 56124 Pisa, Italy – Tel: +39 050 3139426 – Fax: +39 050 3139433 – Email: lgiuliot@vet.unipi.it

## ABSTRACT

Zerasca is an indigenous breed of sheep with endangered status, but it has a primary role in safeguarding Tuscan biodiversity, native livestock production improvement and protection of agricultural districts. Rough countryside with self-shown sloping natural pastures typifies the Zeri area, located in northwest Tuscany at an altitude of 600-1200 m. Over the years, the excellent production of the Zerasca, despite an adverse climate, underlines its strong overall links with the environment. Local shepherds habitually treat animals twice a year with antihelmintic drugs, without laboratory diagnosis, mainly due to a presumed loss of production. The aim of this work is to evaluate the possibility of carrying out a more effective antihelmintic control. The study was conducted in a single flock from January to November 2004 on 48 sheep, sampled monthly for coprological (modified McMaster method) and haematological (PCV) examinations. FECs were transformed [ $\log(\text{FEC}+25)$ ] to normalise the variance. ANOVA test was performed to evaluate environmental factors influencing gastrointestinal worm burden. Repeatability of monthly FECs and PCV were estimated by Pearson's correlations, while the average repeatability between the monthly values was tested using the intra-correlation-class method. Results showed a significant seasonal and individual influence on FECs (mean  $273 \pm 289.12$ ). 65.0% of faeces samples showed an acceptable parasite burden ( $<300$  eggs/g). Data regarding monthly correlations of FECs appear significant in summer, when the helminthic burden does not reach high level. Higher monthly repeatability resulted for PCV (mean  $29.7 \pm 3.65$ ). Our results confirm the feasibility of reducing antihelmintics in Zerasca sheep by a careful investigation of seasonal and individual variability of FECs and PCV; this could have positive repercussions on residual drugs in the animal products and in the soil, and lesser problems connected with pharmacological resistance. In addition, very interesting is the increasing number of studies on genetic resistance: limiting treatment to the non-resistant animals may offer significant economical and ecological advantages for breeding management.

# Production and quality of sheep's milk according to different animal breeding system

A. Pistoia, P. Poli, L. Casarosa, G. Balestri, G. Ferruzzi

Dipartimento Agronomia e Gestione dell'Agroecosistema, Università di Pisa, Italy

*Corresponding author:* Alessandro Pistoia. Dipartimento Agronomia e Gestione dell'Agroecosistema, Sezione Scienze Zootecniche. Via del Borghetto 80, 56124 Pisa, Italy – Tel: +39 050 599205 – Fax: +39 050 540633 – Email: apistoia@agr.unipi.it

## ABSTRACT

The Mediterranean environments do not allow a continuous production of the forages, for this reason there is a seasonal variability of quantitative and qualitative milk production. In sheep, confined management there is a uniformity of feeding which permits to obtain a regular standard of milk production. The present study aims to investigate the effects of two different techniques of sheep rearing on quantitative and qualitative milk production. The trial involved 2 groups of 10 ewes each homogenous in terms of age, parity, body weight and milk production, but reared by two different techniques: - grazing system group with concentrates integration 0.6 kg/kg of milk, - confined rearing group with hay *ad libitum* and the same concentrates 0.6 kg/kg of milk. It has been controlled the monthly milk yield as well as the samples of individual evening and morning milk production. Milk samples are analysed in their chemical and technological characteristics (ASPA methods). The confined ewes produced a higher milk quantity (216.18 vs. 178.09 kg), during the whole lactation period. The pasture management is too much related to the climate variations which, as in the present trial, influence the fodder production. On Spring and Summer 2003 the climate was very dry for a long period. The average feed intake resulted: hay 1.630 kg/head/d and concentrates 0.805 kg/head/d for the confined group; concentrates 0.650 kg/head/d for the grazing group. Physical and chemical milk characteristics resulted better in the grazing group, because of the higher values of fat (7.30 vs. 6.04%), protein (6.47 vs. 5.86%), casein (5.07 vs. 6.40%) and minerals (1.24 vs. 1.11%) percentage, while the milk of confined ewes was more acid (6.76 vs. 6.83). The more acid milk of the confined group showed a better rennet clotting time "T" (9'50" vs. 12'07"), while the grazing group produced an harder curd firmness, 30 min after rennet addition  $a_{30}$  (38.25 vs. 31.44 mm). The productive performances of grazing ewes were conditioned to the limited grass available. The highest fat and protein milk content of grazing ewes are probably due to the less milk production that caused a concentration of milk constituents.

# Milk yield and quality in Comisana ewes intensively reared: effects of dietary fibre content

D. Casamassima<sup>1</sup>, M. Palazzo<sup>1</sup>, M. Albenzio<sup>2</sup>, A. Sevi<sup>2</sup>

<sup>1</sup> Dipartimento Scienze Animali, Vegetali e dell'Ambiente, Università del Molise, Italy

<sup>2</sup> Dipartimento Scienze delle Produzioni, dell'Ingegneria, della Meccanica e dell'Economia Applicate ai Sistemi Agro-zootecnici, Università di Foggia, Italy

*Corresponding author:* Donato Casamassima. Dipartimento Scienze Animali, Vegetali e dell'Ambiente. Via De Sanctis, 86100 Campobasso, Italy – Tel: +39 0874 404704 – Fax: +39 0874 404855 – Email: casamassima.d@unimol.it

## ABSTRACT

The aim of the present study was to assess the effect of different dietary fibre contents on milk yield and quality in Comisana ewes intensively reared. The experiment lasted 11 weeks and was performed on 50 lactating Comisana ewes, divided into two groups of 25 each, balanced for age, parity, time of lambing, body weight and milk yield (728±18 g/d). The ewes were fed a diet consisting of 1.6 kg of alfalfa hay and 0.4 kg of pelleted concentrate (Control group) and of 0.8 kg of alfalfa hay, 1.2 kg of wheat straw and 0.4 kg of pelleted concentrate (Experimental group). The two diets were different only in the NDF content of dry matter (46.6% and 53.4% respectively for Control and Experimental group). Ewe milk yield was recorded daily and individual milk samples were analysed for pH, total protein, fat and lactose content, casein and non-casein nitrogen content, somatic cells and mesophilic bacteria count, phosphorus and urea contents. Jugular blood samples were taken at the beginning, at half and at the end of the trial to assess the concentration of the following metabolic parameters: glucose, total cholesterol, triglycerides, urea, total protein, albumin, calcium, phosphorus, sodium and potassium. Milk yield and major components were not affected by the dietary treatment except for non-casein nitrogen content (0.18 vs. 0.22%;  $P<0.01$ ) and phosphorus concentration (1.54 vs. 1.61 g/kg;  $P<0.05$ ) that were higher in the Experimental group while casein index (0.80 vs. 0.77;  $P<0.01$ ) is higher in Control group. Also haematic parameters were not affected by the NDF level except for total cholesterol content (1.60 vs. 1.76 mmol/L for Control and Experimental group, respectively;  $P<0.01$ ) that was higher in the ewes receiving the diet containing 53.4% of NDF.

These results, in agreement with previous findings, show that in low yielding ewe the use of more fibrous diet makes it possible to reduce feeding costs without detrimental effects on milk yield and composition.

# Organic lamb of the Apulian Region: 1. some quanti-quality traits of (Gentile di Puglia x Altamurana) F<sub>1</sub>

M. Schiavone, F. Nicastro, S. Dimatteo, L. Zezza

Dipartimento Produzione Animale, Università di Bari, Italy

*Corresponding author:* Salvatore Dimatteo. Dipartimento Produzione Animale. Via Amendola 165/A, 70126 Bari, Italy – Tel: +39 080 5442838 - Fax: +39 080 5442822 - Email: s.dima@agr.uniba.it

## ABSTRACT

Lamb meat represents a considerable production in Southern Italy and particularly in the Murgia area, where it is part of the tradition and the life style of the local population. In order to safeguard and turn to account some Apulian native sheep genotypes and to increase the sheep-rearing profitability we have verified the effects of two autochthonous genotypes crossbreeding (Gentile of Puglia x Altamurana) on the lamb production. Some performance parameters and quality traits of light lamb have been therefore evaluated. 6 Altamurana (A) and 6 (Gentile of Puglia x Altamurana) F<sub>1</sub> (GA) half-breed lambs have been naturally suckled from birth to 68 days; their mothers have been reared on pasture. The subjects have been weighed at birth, before and after slaughtering. The daily mean increase, the slaughtering yield and the cool loss have been calculated. The pH values have been measured on shoulder, on *longissimus dorsi* muscle (Ld) and on leg at slaughtering (pH<sub>1</sub>) and after refrigeration at 4°C for 24 (pH<sub>24</sub>), 48 (pH<sub>48</sub>) and 72 hours (pH<sub>72</sub>). The Ld color, according to Hunter Lab system, has been estimated after 24, 48 and 72 hours of refrigeration. All data have been evaluated using Students "t" test (SAS, 1996). The heterosis has been manifest on the weights at birth, greater (P<0.05) for GA (4,450 g) than for A subjects (3,600 g) and on live animals (21,176 vs. 19,379 g). The daily mean increase has been a little higher for hybrid lambs (242.98 vs. 232.05 g/d). The carcasses weights, although without statistical significance, have been higher for the animals F<sub>1</sub>, with 13,283 vs. 12,116 g. The slaughtering yields have turned out almost identical between the two groups (62.52 vs. 62.73%, in A and GA). The emerged differences for cool loss, pH values and color parameters have not been significant, attesting therefore a substantial preservation of the typical quality peculiarities of parent genotypes. To sum up, the characters of the intercrossing breed, i.e. the fast growth and the favorable muscular development, have been appreciable. The terminal hybrid shows improved quantity and quality characteristics.

# Trends in Apulian sheep and goat farming

G. Bramante<sup>1</sup>, R. Roma<sup>2</sup>, E. Pieragostini<sup>1</sup>

<sup>1</sup> Dipartimento Progettazione e Gestione dei Sistemi Agro-zootecnici e Forestali,  
Università di Bari, Italy

<sup>2</sup> Dipartimento Studio delle Società Mediterranee, Università di Bari, Italy

*Corresponding author:* Elisa Pieragostini. Dipartimento Progettazione e Gestione dei Sistemi Agro-zootecnici e Forestali. Via Amendola 165/A, 70126 Bari, Italy - Tel: +39 080 5442842 - Fax: +39 080 5442828 - Email: pierelis@agr.uniba.it

## ABSTRACT

During the second part of the last century, in Apulia, a region traditionally characterized by the relative importance of pastoralism, production and farm structures in small ruminant sector have been drastically affected by the changes occurred in the economic system and in the sanitary rules. The downward slide of the phenomenon seems to be unstoppable and particularly, over the period 1995-2004 the number of small ruminant farms has been reducing of nearly 25%; by comparison with 1995, sheep reduced of 22% and goats of 30%. Anyway the reduction extent is not uniform within the Apulian territory, neither when the sector is generally considered, nor it is subdivided in the different systems of sheep and goat production. The Southern provinces are the most affected by the farms reduction when compared to the province of Foggia, which loosed less than 20%. Large differences in farming systems appear between provinces and particularly, light sheep exhibits the widest variations ranging from -90% Bari, -75% Lecce, -40% Brindisi and Taranto, to -20% Foggia. Further fragmentation may be noticed among the provinces as to the dimension of flocks, where the 50% of all Apulian animals are registered in Capitanata, the area surrounding Foggia. All these considerations outline that sheep and goat farming in the Foggia province is opposite to the trend of the other provinces; this may suggest a strong bound to the territory where the sustainability of this breeding activity is possibly determined by the existence of a local production system. This investigation is the starting point for a research project aimed: - to define homogeneous sub-territories of the Apulian sheep and goat farming, - to reduce differences in breeding techniques for favourite breeds, farm structures and incomes, - to evaluate the effects related to the present Common Agricultural Policy (CAP) (COM 2001- 2529) in comparison with a simulated situation, which mimics a revolutionary change in the aid, supporting quality breeding and environmental sustainability.

# Valorisation of typical products by the study of the most significant qualitative parameters of sheep and goat milk: main results of a national research project

E. Duranti<sup>1</sup>, A. Caroli<sup>2</sup>, E. Cauvin<sup>3</sup>, L. Chianese<sup>4</sup>, M. Martini<sup>5</sup>

<sup>1</sup> Dipartimento Scienze Zootecniche, Università di Perugia, Italy

<sup>2</sup> Dipartimento Sanità e Benessere Animale, Università di Bari, Italy

<sup>3</sup> Dipartimento Produzioni Animali, Epidemiologia ed Ecologia, Università di Torino, Italy

<sup>4</sup> Dipartimento Scienze Alimentari, Università di Napoli, Italy

<sup>5</sup> Dipartimento Produzione Animale, Università di Pisa, Italy

*Corresponding author:* Emilia Duranti. Dipartimento Scienze Zootecniche. Via Borgo XX Giugno 74, 06121 Perugia, Italy – Tel: +39 075 5857108 – Fax: +39 075 5857122 – Email: duranti@unipg.it

## ABSTRACT

Within a national research project (COFIN 2001, prot. 2001077279) attention was paid to different aspects related to the sheep and goat milk quality. The main results are here summarised. Compositional modifications were investigated in Sarda sheep milk. Udders were classed as healthy (H), doubtful (D), or infected (I) on the basis of somatic cell counts (SCC). Both mammary inflammation and involution increased plasmin activity (i.e. 15.6 vs. 18.4 U/mL in H vs. I), which is responsible for a marked protein breakdown in milk. Morphometric analysis of ewe milk fat globules indicated a relationship between the dimension of fat globules and the lactation phase, with an influence on milk quality: a greater number of small fat globules in late lactation implied a greater abundance of unsaturated and long chain fatty acids. The mean diameter of globules were 5.75 (Massese), 4.31 (Comisana), 4.03 (Sarda), 4.23 (Sopravissana) and 4.31  $\mu\text{m}$  (Polimeticcina). Casein composition variability was investigated in sheep. In milk with higher SCC, an important change in calcium sensitive caseins composition occurred. Cheese ripening proteolytic profiles showed a high variability as a function of SCC. A cut-off value of 100,000/ml SCC can be indicated to obtain a more constant cheese texture. Three single-nucleotide polymorphisms (SNP) were identified and characterised at the DNA level at the ovine *CSN1S1*, *CSN2*, and *CSN3*, all resulting in amino acid exchanges. At *CSN1S1* and *CSN2*, the 2 SNPs showed a rather high frequency (ranging from 0.12 to 0.26) in Sarda, Comisana, and Sopravissana breeds. Molecular analysis of the length polymorphic *MUC1* gene was carried out in goat, showing that the repetitive region is an array of 60 bp repeats, in accordance with other species. Fifteen different alleles, ranging from 1500 to 3000 bp, were found in 6 Italian goat breeds. The genetic structure of the casein gene cluster was investigated in Vallesana, Roccaverano, Jonica, Garganica, and Maltese goats. Considerable differences occurred among breeds. The haplotype *CSN1S1\*F-CSN1S2\*F-CSN3\*D* was found in all breeds with frequencies >0.10 and was



# Quality of sheep and goats cheese in Alpine regions of Piemonte

L. Battaglini<sup>1</sup>, L. Decastelli<sup>2</sup>, S. Gallina<sup>2</sup>, C. Lussiana<sup>1</sup>,  
A. Ighina<sup>1</sup>, M. Bianchi<sup>1</sup>

<sup>1</sup> Dipartimento Scienze Zootecniche, Università di Torino, Italy

<sup>2</sup> Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d'Aosta, Torino, Italy

*Corresponding author:* Luca Battaglini. Dipartimento Scienze Zootecniche. Via L. da Vinci 44, 10095 Grugliasco, Italy – Tel: +39 011 6708577 – Fax: +39 011 6708563 - Email: luca.battaglini@unito.it

## ABSTRACT

The aim of the research was to explain quality variations of sheep and goats cheeses produced in Piemonte Alps in different seasons and therefore in different feeding conditions (stabled and at pasture). During 2003, in six farms where Frabosana sheep and Alpina goat are bred, fodders (hays and grass) and one month seasoned cheese samples from the two species were monthly collected. The farms have familiar conduction; they stable animals in winter; they exploit lowland pasture in early spring and alpine pastures in two phases: late spring (<1500 m) and summer (>1500 m). Forty-nine cheese samples (23 from sheep and 16 from goats) were analysed for fat and fatty acids composition, protein and microbiological parameters as prescribed by law (Dir. 92/46/EC). The lack of rain in spring-summer 2003 determined high NDF in grass, growing from spring to summer (from 53.3 to 70.0%) with a decrease of protein (from 16.6 to 10.6%). Concerning sheep cheese the protein is highest at the end of the grazing season (46% DM) and fat is particularly elevated at the beginning of the pasture period (45% DM); high CLA values are observed in the alpine phases (3.6% total FA). Goats, at pasture in all the three phases, show higher CLA content and healthier FA ratio [SFA/(MUFA+PUFA)] in the cheese obtained in the late spring alpine pasture (respectively 3.4 and 1.6%); the dryness of the summer season and the bad quality of grass in summer explains the decrease of goats cheeses' lipids quality in the second alpine phase with a FA ratio equal 2.0. Regarding microbiological parameters fixed by law goat cheeses show a worse situation than sheep ones (*Staphilococcus aureus* 55% negative cases vs. 80% and *Escherichia coli* 55% negative cases vs. 71%); all cheese are negative for *Salmonella* spp. It is possible to say that the variability in quality (chemical and microbiological composition) of small ruminants cheese produced in mountain farms is conditioned by different factors ranging from the animals to the management: it is anyway primarily important to improve fodders quality and adopt a better pasture management.

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