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Intake prediction and energy requirements for lactating dairy small ruminants: Comparison of systems

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milking routines and extension of intervals are usual ways to solve the problem. Both ewes and does are able of being milked once-a-day for the entire lactation, with cost-efficient milk losses (5 to 15%), no effects on udder health, small variations of milk composition and inconsistent effects on dairy products. Automation of milking routines (e.g., cluster removal) and automated milk recording (i.e., electronic identification and milk flowmeters) are now generalized trends, with benefits in milking throughput and genetic improvement. As a result, a greater dairy specialization and easy milkability are expected at the mid-term in dairy small ruminants.

Key Words: small ruminant, dairy sheep, dairy goat

120 Currently available genetic resources in the United States for dairy sheep and dairy goat production. D. Thomas*¹, J.-M. Astruc², A. Carta³, M. D. Pérez-Guzmán⁴, and J.-M. Ser-radilla⁵, ¹University of Wisconsin-Madison, Madison, WI, ²Institut de l'Élevage, Castanet-Tolosan, France, ³DIRPA-AGRIS, Olmedo, Sardegna, Italy, ⁴Instituto Regional de Investigación y Desarrollo Agroalimentario y Forestal, Valdepeñas, Castilla-La Mancha, Spain, ⁵Universidad de Córdoba, Córdoba, Andalusia, Spain.

Industries using specialized dairy breeds of sheep and goats for commercial milk production are well established in Europe and the Middle East but much more recent in North America. Dairy goats were first imported into North America in the early 1900s, but the commercial industry is only about 40 years old. The dairy sheep industry in North America is younger with the first importation of dairy sheep breeds in the early 1990s. Dairy goat breeds of the greatest importance in North America are the breeds of Alpine, LaMancha, Nubian, Saanen, and Toggenburg. Production of genetic evaluations for dairy goats in the US is a cooperative effort by the American Dairy Goat Association, regional dairy records processing centers, and the Council on Dairy Cattle Breeding. There were 589 herds with 17,381 does in this milk-recording program in 2016. Canadian dairy goat genetic evaluations are produced by goatgenetics.ca through cooperation of the Canadian Goat Society, Canadian Livestock Records Corporation (CLRC), Canadian DHI, and Holstein Canada. The primary dairy sheep breeds for commercial production in North America are East Friesian and Lacaune with smaller numbers of British Milk Sheep and Awassi. In Canada, genetic evaluations for dairy sheep have started through GenOvis in cooperation with CLRC. There are no organizations in the US for maintaining pedigree records or calculation of genetic evaluations for dairy sheep. Several successful programs for dairy small ruminants are in operation in Europe for genetic improvement of both production and functional traits (e.g., sheep: French Lacaune and Manech, Spanish Manchega and Latxa, and Italian Sarda; and goats: Spanish Murciano-Granadina, Malagueña, Florida, and Payoya and French Alpine and Saanen). Some of these programs use genomic data as well as traditional pedigree and performance information. These European programs can serve as a source of imported genetics to improve the production efficiency of North American dairy small ruminants and also as examples of the types of improvement programs that could be implemented in North America for continual improvement of local populations of dairy small ruminants.

Key Words: dairy sheep, dairy goat, breed

121 Intake prediction and energy requirements for lactating dairy small ruminants: Comparison of systems. A. Cannas*¹, F. Bocquier^{2,3}, P. Hassoun³, S. Giger-Reverdin⁴, D. Sauvant⁴, L. O. Tedeschi⁵, and G. Caja⁶, ¹University of Sassari, Sassari, Italy, ²INRA-Montpellier SupAgro, Montpellier, France, ³INRA,

Montpellier, France, ⁴INRA-AgroParisTech-Université Paris-Saclay, Paris, France, ⁵Texas A&M University, College Station, TX, ⁶University Autònoma de Barcelona, Bellaterra, Barcelona, Spain.

Feeding systems use similar feed evaluation approaches for all dairy ruminants, whereas feed intake prediction and requirement assessment are species-specific. This review compares the most recent models currently used to predict dry matter intake (DMI) and energy requirements in lactating dairy small ruminants (DSR), i.e., the Small Ruminant Nutrition System (SRNS, 2004 and 2010, updated in the Ruminant Nutrition System, 2016), the NRC(2007), and the new INRA-Systali (2017) systems, to highlight differences in approach, inputs required and flexibility used. Because DSR are normally group fed, accurate prediction of feed intake is necessary to adjust diet composition according to their requirements. However, when predicting DMI for ewes and goats, the approaches used, variables considered and predicted values vary considerably. All the models used are empirical and species-specific, and use body weight and milk yield as main predictors. Variables associated with diet composition and/or type of feeds are also considered, but vary among models, while dietary particle size is not considered. The SRNS and NRC do not have specific models to predict intake on pasture, while INRA uses the Fill Unit system (i.e., based on a forage of reference) to predict DMI considering both housing and grazing conditions. For energy requirements, the SNRS uses the same model for both species, while NRC and INRA use species-specific models. The INRA (2017) largely updated these predictions for all productive functions. For maintenance energy requirements, besides some variability in the basal metabolic rate and energy units used (i.e., ME or NEL), most differences regard the additional factors affecting these requirements (e.g., age, gender, body condition, growth, previous nutrition, movement, cold and heat stress, dietary nitrogen imbalance). Differently, energy requirements for milk production and pregnancy are estimated using similar approaches and values. Overall, the feeding systems for dairy sheep and goats have markedly evolved in the last decade, by improving their ability to account for the great diversity of production systems in which they are raised worldwide.

Key Words: intake, energy requirement, lactating small ruminant

122 ADSA®-EAAP Speaker Exchange Presentation: Animal-environment interactions in dairy small ruminants: Cause-and-effect relationships and strategies of alleviation. A. A. K. Salama*¹, D. R. Yañez-Ruiz², C. Fernandez³, N. Koluman⁴, M. Ramon⁵, N. Silanikove⁶, A. Goetsch⁷, and G. Caja¹, ¹Group of Ruminant Research (G²R), Universitat Autònoma de Barcelona, Bellaterra, Spain, ²Estación Experimental del Zaidín (CSIC), Armilla, Granada, Spain, ³Research Centre ACUMA, Animal Science Department, Polytechnic University of Valencia, Valencia, Spain, ⁴Cukurova University, Agricultural Fac., Department of Animal Science, Adana, Turkey, ⁵Centro Regional de Selección y Reproducción Animal (CERSYRA-IRIAF), Valdepeñas, Spain, ⁶Institute of Animal Science, Agricultural Research Organization, Volcani Center, Bet Dagan, Israel, ⁷American Institute for Goat Research, Langston University, Langston, OK.

Carbon footprinting can be useful to assess how activities such as different types of livestock production impact climate change. Sheep and goats represent approximately 55% of ruminants in the world, although they produce just 12 to 14% of greenhouse gases emitted, with CH₄ from enteric fermentation contributing over 60% of total emissions. Concentrate feedstuffs often used to meet nutrient requirements decrease CH₄ emission but can increase diet cost. Alternatively, the partial replacement of grains with agricultural byproducts in combination with sources of