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The absorption of colostrum proteins in newborn lambs: an iTRAQ proteomics study

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Introduction

Colostrum is the first source of nutrition in neonatal ruminants, supplying not only nutrients, but having also a fundamental biological function, promoting immunoglobulin transfer from the dam to the newborn. As previously described, newborn ruminants are hypogammaglobulinemic, as the complexity of the synepitheliochorial ruminant placenta does not allow a sufficient transfer of immunoglobulins (Ig's) from the dam to the foetus (Castro *et al.*, 2011). As a consequence, colostrum intake and colostrum protein absorption plays an essential role in Passive Immune Transfer (PIT) and ultimately in the newborn survival rate (Stelwagen *et al.*, 2009).

The aim of this study was to determine which proteins present in the colostrum are absorbed by newborn lambs during the first 14 hours after birth using proteomic methodologies for identification and quantitation. Quantification was based on using the iTRAQ (isobaric tag for relative and absolute quantitation) method. This approach could describe proteins that relate to either PIT or lamb immune system development.

Material and methods

Sample collection

Eight newborn lambs (Canaria breed) were used for their ability to take up colostrum proteins. The experiment took place at the experimental farm of the Veterinary Faculty of the Universidad de Las Palmas de Gran Canaria during the spring 2011. Two groups of animals (of 4 each) were fed colostrum at two different time points after birth. As observed in Figure 1, one group (termed colostrum group; C group) received colostrum, at 2, 14 and 26 hours after birth, while the other group (termed delayed colostrum group; DC group) was fed with colostrum at 14 and 26 hours after birth. At the end of the colostrum feeding period (26 hours after birth), each animal (from both groups) took the same amount of fresh colostrum from a pool with