

**Estimation of carbon footprint and sources of emissions of an extensive alpaca production system**G. Gómez Oquendo<sup>1,2</sup>, K. Salazar-Cubillas<sup>3</sup> and C.A. Gomez<sup>4</sup>

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Following international standards procedures, a cradle-to-gate life cycle assessment of an extensive alpaca production system was conducted to determine its carbon footprint (CF)<sup>1</sup>. The study was conducted during the dry season in a typical Peruvian alpaca production system for meat and fibre production comprising 1,492 alpacas (young, tuis, and adults) with an average fertility rate of 80%, a birth rate of 54%, and an offtake rate of 20%. Alpacas grazed native grassland for 8-10 h daily with supplementation of oat hay. Emissions from outside the system (fuel, electricity, and fertilizers) and within the system (methane (CH<sub>4</sub>) from enteric fermentation, and nitrogen dioxide (NO<sub>2</sub>) and CH<sub>4</sub> from manure management) were quantified. Following that, CF was calculated based on mass, economics, and biophysical allocations and expressed in kg of carbon dioxide equivalents (CO<sub>2</sub>-e). The functional unit for economic and mass allocations was 1 kg of live weight (LW) while for the biophysical allocation was 1 kg of LW and 1 kg of fibre. The CF uncertainty was calculated using a Monte Carlo simulation with a prediction interval of 2.5 to 97.5% of the uncertainty distribution. The largest source of greenhouse gas emissions was CH<sub>4</sub> emissions from enteric fermentation (67%), followed by direct and indirect NO<sub>2</sub> (29%), emissions outside the system (3%), and CH<sub>4</sub> from manure management (1%). For economic and mass allocations, CF was estimated at 24.0 and 29.5 kg of CO<sub>2</sub>-e of LW, respectively, while for the biophysical allocation was 22.6 and 53 kg CO<sub>2</sub>-e per kg LW and fibre, respectively. These results provide information that can be used to develop strategies for reducing greenhouse gas emissions from alpaca production systems. <sup>1</sup>ISO 14040: 2006. Environmental management – life cycle assessment – principles and framework.

**Influence of feeding technique of silage on behaviour in growing pigs**J. Friman<sup>1</sup>, E. Verbeek<sup>2</sup> and M. Åkerfeldt<sup>1</sup>

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Long straw silage is provided as enrichment to organically raised pigs, but seldom included as an ingredient in their feed rations. Grass and legumes show favourable protein and amino acid composition and are of interest as sustainable locally produced feed ingredients. Research have emphasized that feeding silage as a pellet or fresh with a short straw length in total mixed rations (TMR) increase feed intake and nutrient utilization compared to long straw silage. However, feeding pelleted or short chopped silage might not fulfil the pigs need for foraging and exploration. The aim of this study was to evaluate how pre-treatment (chopped or dried) and feeding technique (pelleted or TMR) of silage affected pig behaviour. In total 126 growing pigs were randomly divided into three dietary treatments, either a commercial control diet without silage inclusion (Pellet-C) or a cereal-based pellet containing dried and milled silage (Pellet-S) or a TMR containing fresh short chopped silage, mixed with commercial pelleted feed (TMR-Ch). It was hypothesized that feeding the TMR diet would increase activity levels and feed-related behaviours. Pigs were observed on three occasions at two-week intervals with both instantaneous and continuous sampling. Preliminary results show that diet affected activity level and feed related behaviours ( $P < 0.05$ ). Pigs fed the TMR-Ch diet spent significantly more time eating and rooting (8.3% and 6.8%, respectively) compared to pigs fed the Pellet-C diet (5.6% and 3.8%, respectively) ( $P < 0.001$ ). Activity level were higher for both pigs fed TMR-Ch diet (19.8%) and the Pellet-S diet (14.4%) compared to the Pellet-C diet (13.8%) ( $P < 0.001$ ). These preliminary results indicate that short chopped silage fed as TMR significantly increased foraging and exploratory behaviours. Pigs that received pelleted silage were generally more active compared to the control diet, suggesting that pelleted silage may have a small benefit over a standard diet. Further analysis within the study will evaluate the effect of feeding silage on the gut microbiota composition and its influence on pig's behaviour.