



Deutscher Tropentag, October 9-11, 2002, Witzenhausen  
“Challenges to Organic Farming and Sustainable Land Use  
in the Tropics and Subtropics”

## Genetics of Growth Traits in Bolivian Llamas

MARIA WURZINGER<sup>1</sup>, JAVIER DELGADO<sup>2</sup>, MICHAELA NÜRNBERG<sup>2</sup>, GUIDO UGARTE<sup>3</sup>, ANNE VALLE ZÁRATE<sup>2</sup>, ANGELIKA STEMMER<sup>4</sup>, JOHANN SÖLKNER<sup>1</sup>

<sup>1</sup>University of Agricultural Sciences (BOKU), Department of Livestock Sciences, Austria

<sup>2</sup>University of Hohenheim, Institute for Animal Production in the Tropics and Subtropics, Germany

<sup>3</sup>Asociación de Servicios Artesanales y Rurales (ASAR), Bolivia

<sup>4</sup>Universidad Mayor de San Simón, Bolivia

### Abstract

Llama breeding plays an important role in the High Andes of Bolivia, because of the extreme environment that limits the cultivation of any kind of crop plants. All products of llamas are used within the local community. The University of Hohenheim, Germany works together with the local NGO ASAR (Asociación de Servicios Artesanales y Rurales) and the Universidad Mayor de San Simón, Cochabamba, Bolivia and the University of Agricultural Sciences, Vienna, Austria, on a project with the aim of providing a comprehensive description of the system of llama keeping and investigating possible pathways for improvement.

Genetic selection is one way of improvement. Changes in performance achieved by selection are usually small but in contrast to other kinds of improvement they are permanent and cumulative. To evaluate the opportunities for genetic selection, phenotypic and genetic parameters for the traits of interest were estimated. Results presented here concentrate on such parameters for growth traits.

Two different types of llamas were distinguished. “Th`ampullis” are regarded as “wool-llamas” with notably higher fleece yields than “Kh`ara” which are assumed to be meat-oriented llamas with reduced fleece growth.

Growth curves for the two types for the five body measurements body weight (BW), height at withers (HW), body length (BL) chest circumference (CC) and abdomen circumference (AC) were described with the nonlinear Brody function  $y(t) = a * (1 - b * e^{(-k*t)})$ . Differences in the rate of maturing and size at maturity were found between females of the Th`ampulli and the Kh`ara types. The two sexes (only compared in the Th`ampulli type) showed also differences in rate of maturity and size. Heritabilities and genetic correlations were estimated using animal model procedures where all information came from mother-offspring relationships. Heritability estimates were 0.36, 0.27, 0.15, 0.09 and 0.11 for BW, HW, CC, BL and AC, genetic correlations varied between 0.55 and 0.94. Heritabilities and genetic correlations of body measurements are similar to estimates from other livestock species. This indicates that changes by genetic selection are quite easy. Given the high adaptive value of body size, care has to be taken regarding selective changes under the extreme environmental conditions of the High Andes.

**Keywords:** Body measurement, heritability, llama, weight