



Tropentag, September 14-16, 2010, Zurich

“World Food System —
A Contribution from Europe”

Predicted and True Herd Development Over Ten Years by Applying a Bio-economic Model to Village Cattle in South-western Niger

ALINE DOS SANTOS NEUTZLING¹, CHRISTIAN HÜLSEBUSCH², BRIGITTE KAUFMANN², EVA SCHLECHT¹

¹*University of Kassel / University of Göttingen, Animal Husbandry in the Tropics and Subtropics, Germany*

²*German Institute for Tropical and Subtropical Agriculture (DITSL), Germany*

Abstract

The PRY Herd Life Model, developed in the 1990s by R. Baptist, is a species-independent tool that enables ex-ante evaluation of livestock productivity, population size and structure. For an initial population, a stochastic model component simulates births, losses and culls over time, whereby the fitness parameters are fixed for the modelled period. The current study used PRY to predict size and structure of a village cattle herd over 10 year periods and compared the results to actual population development.

Progeny history interviews were conducted in the same 40 cattle-keeping households in Chikal, Niger, in 1998 (data from 79 cows, covering 270 animals) and 2008 (96 cows, 151 animals), and age at first parturition (AFP, months), parturition interval (PI, months), mortality rate (MR, dead over live animals) and the combined offtake/culling rate of young and adult females were calculated. PRY was used to predict herd size and structure over ten years (1998–2008; 2008–2018) using average values of 100 simulation runs each.

Significant differences between 1998 and 2008 occurred in AFP (60.5 ± 10.3 ; 72.3 ± 15.1) and offtake/culling rate of adult females (45%; 27%), while PI (25.5 ± 5.3 ; 26.8 ± 8.2), MR (18%; 16%) and the offtake/culling rate of young females (30%; 29%) were rather constant over time. Predicted herd sizes after 10 years were 153 ± 28 (1998–2008) and 110 ± 48 (2008–2018). The predicted population consisted of 44% and 29% adult females (1998–2008, 2008–2018), 45% and 58% young females and 11% and 11% young males, while actual population structure in 1998 and 2008 were 48% and 52% adult females, 18% and 20% young females, and 17% and 22% young males.

PRY thus realistically predicted herd size over the 1998–2008 period, while the prediction of 2008 herd structure was not in accordance with actual data. Main reasons for this divergence were farmers' changed offtake/culling strategies for adult females and the prolonged AFP, which were not captured by PRY. The model's assumption of unvarying management might therefore be changed to more flexible rules, so as to increase confidence when using PRY for ex ante assessments of longer-term herd development.

Keywords: Population growth, productivity indicators, PRY herd model, West Africa