

# The use of system dynamics modelling methodologies in sheep breeding programs and management systems

K. T. Gebre<sup>a</sup>, M. Wurzinger<sup>b</sup>, S. Gizaw<sup>c</sup>, A. Haile<sup>d</sup>, B. Rischkowsky<sup>d</sup>, J. Sölkner<sup>b</sup>

<sup>a</sup>Mekelle University, Mekelle, Ethiopia

<sup>b</sup>University of Natural Resources and Life Sciences Vienna (BOKU), Austria

<sup>c</sup>International Livestock Research Institute (ILRI), Addis Ababa, Ethiopia

<sup>d</sup>International Center for Agricultural Research in the Dry Areas (ICARDA), Tel Hadya Aleppo, Syria

## Introduction

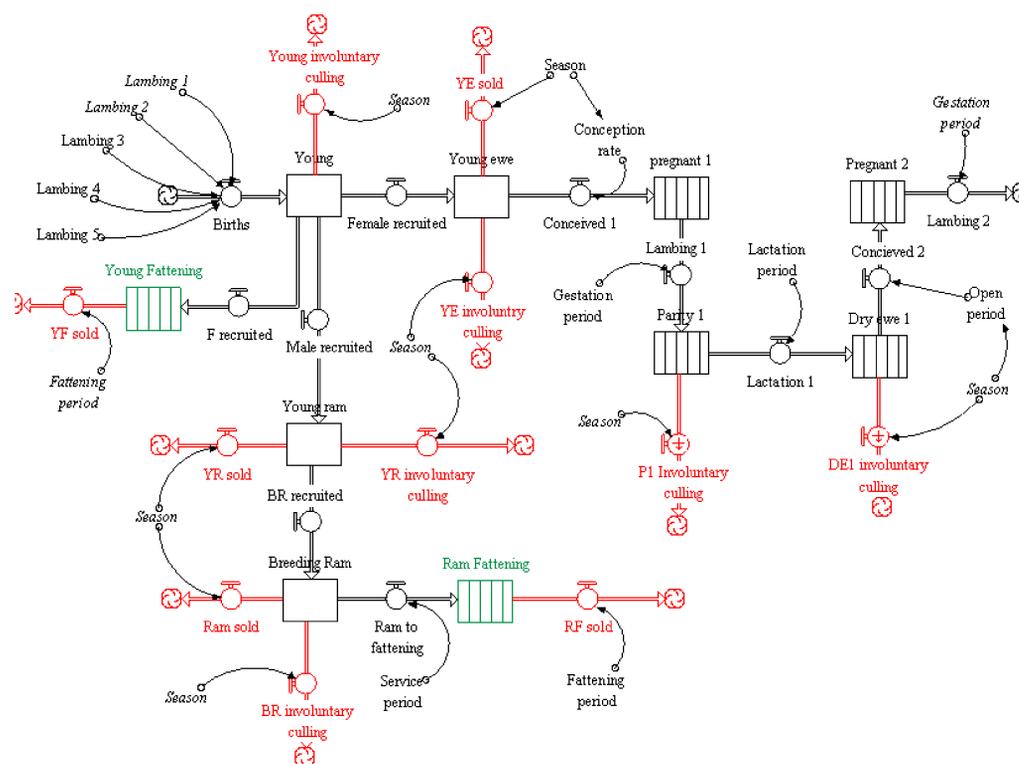
➤ System dynamics modelling approach has been used in the agricultural sector to describe livestock production systems, livestock health and natural resource management. However, so far it has not been applied for modelling of livestock breeding programs.

## Objectives

➤ To explore the utility of system dynamics modelling in evaluation of sheep breeding programs and management systems in the Ethiopian highlands.

## Materials and methods

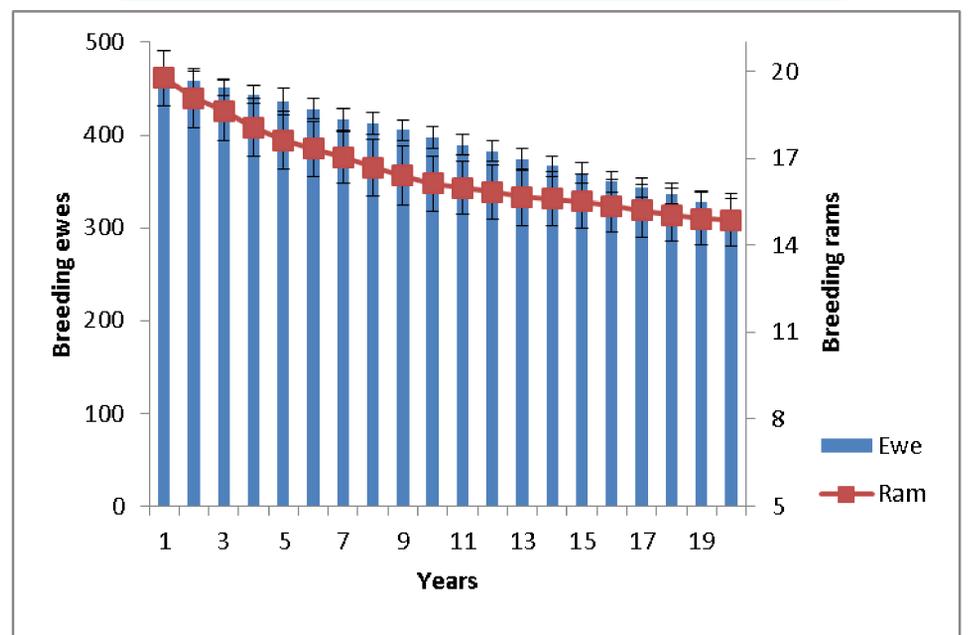
- Sheep breeding system in Menz highlands, Ethiopia.
- Historical rainfall, temperature and sheep performance data.
- The model accounts for pasture growth, nutrient requirement and seasonal variation in animal performance, physiological status and aging chain of the herd.
- Technical evaluation and extensive logic testing during the building phase to evaluate the model



The herd aging chain model

## Results and discussion

- The model demonstrates that balancing feed supply and demand is crucial.
- The simulation model creates herds at equilibrium
- Decrease in flock size due to genetic selection for body weight.
- Reasonable annual genetic gain is predicted for the breeding goal traits (e.g. six month weight 0.213 kg per year).
- Increase of feed supply only does not result in increase of farm income.
- Increase of feed supply combined with genetic selection and fattening of young animals increases profit.



## Conclusions

- System dynamics modelling is useful to describe breeding programs and management systems by building simple, flexible and usage driven simulation models. Models may be made more complex and close to reality than with conventional analysis of breeding programs.

## Acknowledgements

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