

142. Development of a mathematical model to study the impacts of production and management policies on the dynamics of a dairy goat herd in the northeast of Brazil

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A mathematical model of a dairy goat farm was built to study the dynamics of a herd over time under different management policies. A system dynamics approach was used to develop the feedback structure of the model, which was programmed into Vensim[®]. The time unit was day with a time step of 0.05. The model was developed to simulate a semi-intensive system where all parameters assumed average values reported in the production system at the *Brazilian Agricultural Research Corporations (Embrapa-Goats)*. The pregnancy rate and the number of kids born per doe were assumed to be respectively, 0.47% and 1.0 for nuliparous and 0.67% and 1.67 for multiparous does. The present model assumed the natural condition in the northeast of Brazil where the animals are not affected by photoperiod. The gestation and lactation length was respectively, 5 and 6 months and does would stay in the herd for up to 8 lactations. Management policies were manipulated through modifications of two key indexes: culling rate (CR), which is the percentage of culled animals per year; retention rate (RR), which is the percentage of retained animals that were born in the herd per year. Were established a maximum of 75 animals in the herd. In the first simulation, 20 nuliparous does, 0%/yr of CR and 100%/yr of RR were assumed to simulate a growing herd. In this scenario, 3.3 years were necessary to reach the herd capacity. When increasing the pregnancy rate by 20% the time to reach the herd capacity decrease 1.7 months but, when the pregnancy rate was decreased by 20% the impact was 3.6 more months to reach the equilibrium. The increase in the time to reach the equilibrium could represent a smaller amount of animals for sale and also for genetic selection. Based on these results, a special attention, by farmers, on reproductive characteristics is decisive to avoid great losses in the production system. This model is important to further understand major feedback loops affecting dairy goat production systems in the Brazilian northeast.

143. Impact of puberty and lactation order of a dairy goat herd in the northeast of Brazil

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A dairy goat model was built to study the impacts of puberty and lactation order in a herd over time. A system dynamics approach was used to develop the feedback structure of the model, which was programmed into Vensim[®]. The model was developed to simulate a semi-intensive system where all parameters assumed average values reported in the production system at the *Brazilian Agricultural Research Corporations (Embrapa-Goats)*. The pregnancy rate and the number of kids born per doe were assumed to be respectively, 0.47% and 1.0 for nuliparous and 0.67% and 1.67 for multiparous does. The present model assumed the natural condition in the Northeast of Brazil where the animals are not affected by photoperiod. The gestation and lactation length was respectively, 5 and 6 months and the number of lactation allowed per doe, were manipulated to verify the impact in the herd. Also the time to reach the adult phase (puberty) was changed to simulate an ideal situation and small farmer's reality (food limitation). An equilibrium herd of 75 animals was modeled. In the first simulation where the time to reach the adult phase was 8 months, keeping does until the 6th lactation had 1.2% more milk production compared to systems keeping does until the 8th lactation. Results indicated that although the volume of milk was higher for the 6th lactation, when considering until the 8th lactation, the number of young does