The optimal number of heifer calves to be reared as dairy replacements

ABSTRACT

Dairy farmers often keep almost all their newborn heifer calves despite the high cost of rearing. By rearing all heifer calves, farmers have more security and retain flexibility to cope with the uncertainty in the availability of replacement heifers in time. This uncertainty is due to mortality or infertility during the rearing period and the variation in culling rate of lactating cows. The objective of this study is to provide insight in the economically optimal number of heifer calves to be reared as replacements. A herd-level stochastic simulation model was developed specific for this purpose with a herd of 100 dairy cows; the biological part of the model consisted of a dairy herd unit and rearing unit for replacement heifers. The dairy herd unit included variation in the number of culled dairy cows. The rearing unit incorporated variation in the number of heifers present in the herd by including uncertainty in mortality and variation in fertility. The dairy herd unit and rearing unit were linked by the number of replacement heifers and culled dairy cows. When not enough replacement heifers were available to replace culled dairy cows, the herd size was temporarily reduced, resulting in an additional cost for the empty slots. When the herd size reached 100 dairy cows, the available replacement heifers that were not needed were sold. It was assumed that no purchase of cows and calves occurred. The optimal percentage of 2-wk-old heifer calves to be retained was defined as the percentage of heifer calves that minimized the average net costs of rearing replacement heifers. In the default scenario, the optimal retention was 73% and the total net cost of rearing was estimated at €40,939 per herd per year. This total net cost was 6.5% lower than when all heifer calves were kept. An earlier first-calving age resulted in an optimal retention of 75%, and the net costs of rearing were €581 per herd per year lower than in the default scenario. For herds with a lower or higher culling rate of dairy cows (10 or 40% instead of 25% in the default scenario), it was optimal to retain 35 or 100% of the heifer calves per year. Herds that had a lower or higher cost of empty slots (€50 or €120 per month instead of €82 in the default scenario) had an optimal retention of 49 or 83% per year; the optimal retention percentage was dependent on farm and herd characteristics. For Dutch dairy farming conditions, it was not optimal to keep all heifer calves.

Keyword: Dairy replacement; Young stock rearing; Culling; Cost