Doctoral Thesis

Wirtschaftlichkeit verschiedener Rindertypen
Vergleich von Milch- und Zweinutzungsrassen

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Publication Date:
1998

Permanent Link:
https://doi.org/10.3929/ethz-a-001945739

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Wirtschaftlichkeit verschiedener Rindertypen: Vergleich von Milch- und Zweinutzungsrassen

ABHANDLUNG
zur Erlangung des Titels
DOKTOR DER TECHNISCHEN WISSENSCHAFTEN
der
EIDGENÖSSISCHEN TECHNISCHEN HOCHSCHULE
ZÜRICH

vorgelegt von
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Zürich 1998
Summary

Cattle production has a central position in Swiss agriculture. Approximately 50% of total income derives from cattle production. Milk and beef can either be produced with dairy breeds or with dual purpose breeds. The efficiency of different breeds strongly depends on the production environment. The objective of this study was to compare the relationships between input and output (costs and returns) for Holstein, Jersey, and Simmental cattle. The production system comprised milk production, replacement, bull and calf fattening. For this purpose, a computer program developed by Amer et al. (1994) and adjusted to fit the actual problem was applied. The herds were described using a deterministic model. To derive the necessary biological and economic functions, data collected on the research station Chamau from 1987 to 1995 and data taken from scientific literature were used.

A reference situation was defined for comparison. Milk quota was 100 000 kg and the milk was paid independently of milk content. Annual housing costs amounted to 6.3% of the invested capital. Labor was compensated with CHF 21.10 per hour. Since no voluntary culling was applied in the cow herd, one half of the cows were available for commercial crossings with bulls of beef breeds. All male calves were used in bull fattening. All female calves from crossings with beef sires were used in calf fattening. The age at first calving was 24 mo and 30 mo for dairy types and Simmental, respectively.

Assuming the reference situation described above, one kg milk produced in Holstein herds (if fattening was also considered) was 24 Rp. cheaper than in Jersey herds and 16 Rp. cheaper than in Simmental herds. Housing costs for milk production including rearing of replacement heifers were 23, 24, and 31 Rp. per kg milk for Holstein, Jersey, and Simmental, respectively. Decreasing housing costs resulted in better results especially for breeds with lower production per place. Labor costs for milk production including rearing of replacement heifers were 28, 42, and 37 Rp. per kg milk for Holstein, Jersey, and Simmental, respectively. Therefore, a reduction of labor costs would especially pay off for those breeds with lower production per animal. The third large cost component are feeding costs. When silage is
allowed to be fed all year around, the feeding costs for dairy cows are 29.8, 36.4, and 32.2 Rp. per kg milk for Holstein, Jersey, and Simmental, respectively.

When the milk is used for production of raw milk cheese, silage feeding is not allowed. As a consequence, the feeding costs increase to 34.2, 41.9, and 37.4 Rp. per kg milk for Holstein, Jersey, and Simmental, respectively.

The production of milk with a higher fat and protein content results in clearly higher production costs and can be considered only if higher prices are guaranteed. Under a price system in which the value of protein is twice as high as the value of fat, and with a fat quota of 4000 kg, the results are slightly worse for Holstein, but considerably better for Jersey, and somewhat better for Simmental.

When milk production is limited by a fat quota, the meat revenue from dairy breeds is significantly lower than that from Simmental. This can be explained by reduced meat quality and by lower meat production, which is a consequence of smaller number of animals in Holstein and lower live weights in Jersey. Assuming constant meat prices, Simmental herds will achieve the same net revenue per ha as Jersey herds only if milk prices are reduced by 30 %. To achieve the same net revenue per ha as Holstein herds, a reduction of milk prices by 40 % is required.

Decreasing prices of concentrates under a fat quota of 4000 kg results in increased herd results for all three breeds in an amazingly similar amount. The reason is that in all herds approximately the same total amount of concentrates is needed, although the consumption per animal is considerably different. This can primarily be explained through different number of animals, total feed consumption potential, and fattening strategies of bulls.

When more heifers than needed for replacement are reared, the net herd revenue decreases for all three breeds. High rearing costs and significantly lower revenues from calf and bull fattening are the reason. Higher replacement rates reduce the number of crossings with bulls of beef breeds and thus, the number of animals available for meat production.

Although a higher age at first calving results in higher milk production in the first three lactations, the herd net revenue is significantly reduced for all three breeds, because replacement costs are significantly higher.
In larger production units the herd net revenue is higher for all herds because of decreasing housing and labor costs per animal. Especially for breeds with high housing and labor requirements per produced unit, production in larger herds is favourable. Although a higher milk production requires more expensive rations, it leads to reduced feeding costs per kg milk. Moreover, housing, labor, and replacement costs per kg milk are reduced. Because of a decreasing number of animals, the land requirements and the revenue from slaughter animals are reduced.

In long term consideration, large milk types are advantageous in most situations.