Produktionstechnische und wirtschaftliche Untersuchungen über den Futteraufwand bei Milchkühen während der Laktation

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ABHANDLUNG
zur Erlangung des Titels eines
DOKTORS DER TECHNISCHEN WISSENSCHAFTEN
der
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vorgelegt von
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Zürich 1982
Feed intake of dairy cows during the period of lactation in view of production and economy.

by Peter Bieri.

This research work deals with feed intake, milk yield, body weight, nutrient requirements, and feeding costs of milk cows. The daily feed intake records have been summarized at the experimental station of the Department of Animal Breeding at the Swiss Federal Institute of Technology in Zurich. The investigation consists of 10,575 weekly recorded milk yield and feed intake data. In summer and winter roughage was given ad lib. In addition to this fodder, concentrates were used to satisfy the nutrient requirements of the animal.

The influence of breed, number and stage of lactation, pregnancy, and season is estimated by different statistical models. Differences in milk yield, body weight, and feed intake could be seen between Holstein Friesians and the two dual purpose breeds, Braunvieh and Simmental. Holstein Friesian cows eat 1.5 - 1.9 kg DM per day more than the two other breeds. Between the first and the third lactation period the total feed intake is mounting an average of 3 kg DM per day. After calving the feed intake is rather low. In order to satisfy the nutrient requirements during this period, specific concentrates had to be added. However, among the breed of Holstein Friesians, there still is a lack of energy up to 30 MJ NEL per day.

Correlations between feed intake, body weight, and milk yield are influenced by factors such as stage of lactation, and in which manner roughage and concentrates are used. Using LSQ-Residuals the correlation between milk yield and total feed intake is .46. However, if this correlation is calculated for different stages of lactation, it increases from .45 at the beginning of the lactation up to .82 during mid-lactation. Similar changes can be found within other parameters. Roughage and total feed intake can be estimated in a rather precise way, by choosing a statistical model consisting of discrete variables - breed, number and stage of lactation, and season - as well as continuous variables such as milk yield and body weight ($R^2 > .6$).
On the whole, feeding costs are mainly linked with milk yield. If production ascends from 3000 to 6000 kg FCM, relative feeding costs diminish from Fr. .50 to Fr. .38 per kg FCM. In our experiment about 50% of the milk profit had to be invested to cover the feeding costs.