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Introduction Condition of Alfalfa in Dairy Farming at Upland Area

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Summary

▪ In order to raise the rate of food self-sufficiency in Japan, it is necessary to raise the rate of feed self-sufficiency in land use type livestock farming, which can contribute to improvements required in the livestock raising sector. Expansion of high quality self-supplied feed production that can be fed to high yield dairy cattle becomes central to raising the rate of feed self-sufficiency in dairy farming. In order to resolve this issue, the National Agricultural Research Center for Hokkaido Region, project research aiming at extension of the alfalfa new kind developed here in Tokachi and Abashiri area is being conducted.

There, stable cultivation of alfalfa, low moisture silage preparation and storage technology, and feeding technology corresponding to high yield dairy cattle are being developed, the target of which is to establish a high quality self-supplied feed production and feeding system that incorporates alfalfa with high feed value.

This paper aims to clarify the conditions following the introduction of alfalfa into dairy farming, and to present the development target for systematization as the extension of alfalfa. Therefore, the determining factors of the rate of feed self-sufficiency in Hokkaido dairy farming was examined first. Next, the upland type dairy farming was taken up as a case farm, and the

programming model of the upland type dairy farming was constructed based on linear programming by using a technological coefficient of the case farm. And, conditions (for production cost and yield, etc.) necessary because alfalfa was introduced by using this model was clarified.

The business environment involving dairy farming caused a fall of the comparative profitability of self-supplied feed production, or land net return, and relative stagnation of self-supplied feed production technique. Consequently, the rate of feed self-sufficiency in dairy farming fell. On the other hand, dairy farmers who raised the rate of feed self-sufficiency achieved management success. In order to raise the rate of feed self-sufficiency into the future, while the business environment factors that have caused the fall in the rate of feed self-sufficiency become lessened, the development direction of dairy farming must also be changed.

When alfalfa production is viewed in relation to all sown pastures in Hokkaido, it is minor type of sown pasture, and the rate of alfalfa cultivation has been falling since the second half of the 1990s. In the upland zone, the Abashiri area has a high rate of alfalfa cultivation and it has a fixed status in sown pastures. On the other hand, although the rate of alfalfa cultivation in the Tokachi area is small, a fixed area was maintained through the second half of the 1990s, and future expansion is expected.

In the Obihiro-Kawanishi region of the Tokachi area, which contains fields of project research, the introduction of alfalfa by dairy farmers with high yield dairy cattle and large scale is progressing. It is thought that alfalfa is highly regarded among dairy

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farmers, and it is highly probable that its cultivation will be extended widely if the cultivation technology is established. A case farm for the programming model has introduced alfalfa in upland type dairy farming, and has realized high milking yield depending on the abundant feeding of roughage. Therefore, it is thought that this farm is suitable as a case farm for the programming model examined as follows.

The programming model of the upland type dairy farming based on linear programming aimed to maximize agricultural income while supplying the necessary nourishment for dairy cattle with self-supplied forage or purchased concentrates under conditions of constant manpower, the farmland area and number of cattle. Various coefficients necessary to make the simplex tabular were set based on results of the case farm in 1999. The examination was conducted on the assumption that there was no change in the feeding system of the case farm (tie stall type cowshed and pipeline milking) in the programming model. Because we could confirm that the optimum solution of the programming model nearly corresponded to the current state of the case farm, it was judged appropriate as the

programming model.

Technological coefficients (alfalfa yield and milking yield etc.) in the programming model to introduce alfalfa were gradually changed, and the conditions following the introduction of alfalfa into dairy farming were clarified based on the optimum solution that had been obtained at each stage. As a result, because alfalfa was introduced into the upland type dairy farming, it was clarified that 828 kg/10a of dry matter alfalfa yield and 19 thousand yen/10a of production cost became the lower bound target of technological development, and 30 or more ha of forage production area became farm conditions.

There was no one that became an introduction condition regarding other technological coefficients, and it was specified as a condition for the widely introduction of alfalfa. Introduction of alfalfa leads to higher milking yields. Even if dry matter alfalfa yield is improved more than 1,104 kg/10a, it will have no additional positive meaning since the alfalfa area is at its maximum when dry matter alfalfa yield is 1,104 kg/10a.