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Introduction Condition of Controlled Grazing in Dairy Farming at Upland Area

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Summary

▪The survival of family farms is important for the development of Hokkaido dairy farming. A production system to raise the agricultural income rate without scale expansion is required for survival, so technology to reduce cost is indispensable. Controlled grazing extension in recent years is a technology that can meet this demand, and contribute to the improvement of food self-sufficiency, stated as a policy target by "The Basic Law on Food, Agriculture and Rural Areas". Controlled grazing has been remained in the limited farm though it has extended steadily. The bottleneck in an extension of this technology is lack of the elucidation of the suitable conditions for introducing this technology into dairy farming.

This paper aims to clarify the conditions in order to come to a decision regarding the introduction of controlled grazing technology into dairy farming, and to present the development target for systematization to spread the technology. For this, the difference of the location of controlled grazing between the grassland type dairy farming and the upland type dairy farming of Hokkaido was clarified in the beginning. And, the upland type dairy farming was taken up as a case farm, and the introduction and the effect of controlled grazing there were examined. Next, the programming model of the upland type dairy farming was constructed based on linear programming by using technological coefficients of the case farm. And, some prerequisite conditions (for production cost and yield, etc.) by which controlled grazing would smoothly work were estimated by using this model.

Even if the same controlled grazing is introduced into dairy farming, the meaning is different in the Tokachi region of the upland area and the Nemuro region in the grassland area. In a word, controlled grazing can be understood as an extremely unique technology in a Tokachi region where the year-round housing system is predominant. It is, however, characterized as a labor saving production system with high dependency on self-supplied forage, which will have the structure of "high profitability with low cost and low income". On the other hand, the difference between farmers introducing controlled grazing and farmers carrying out conventional grazing is not so clear in the Nemuro region where conventional grazing of milking cattle is still widely practiced. In controlled grazing the management of the technological level is high with the small management cost and the high profitability, compared with conventional grazing farming.

The farm used in the case study for the programming model was tow-generation family farm located in the upland area in the Tokachi region, and the controlled grazing was started in 1991. The following managerial results were attained there. ① reduction of cost, ② shortening of working hours, ③ decrease of diseases among cattle, ④ decrease in amount of manure treatment, ⑤ improvement of landscape and environment of farm. In the case farm, a high agricultural income was achieved by introducing controlled grazing technology due to the reduction of management cost. Therefore, it is thought that this farm is suitable as the case farm of the programming

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model examined as follows.

The programming model of the upland type dairy farming based on linear programming aimed to maximize agricultural income while supplying necessary nourishment to cattle with self-supplied forage or purchased concentrates under conditions of constant manpower, 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 (grass yield and milking yield etc.) in the programming model to introduce controlled grazing technology was gradually changed, and some suitable conditions for the introduction of this technology into dairy farming were clarified based on the optimum solution that had been obtained at each stage. As a result, 30% decrease in grass yield (= 2,174 kg/10a) and 25% decrease in total digestive nutrition content of grazing grass (= 10.0%) became the lower bound target of technological development compared with the standard set in the programming model. There were not other coefficients that acted as restrictions; rather they were conditions that favored the effective use of controlled grazing technology. The grazing area and the self-sufficiency rate of total digestive nutrition rose the most of all by 30-23 working hour per day per three basic labor force restriction or 10-30% decrease in milking yield (=6,980-5,429 kg). Moreover, 30% or more increase in grass yield (= 4,038kg/10a) has no positive meaning for the introduction of controlled grazing technology, because the grassland area reaches its limit at that time. Similarly, a 10% increase in total digestive nutrition content of the grazing grass (=14.6%), 30 working hour per day restriction, 16 ha of grassland area restriction, and 10% increase in milking yield (= 8,531kg) became the upper limits.