

## REVIEW

# The Farm-type TMR Center as a Regional Farming System in Hokkaido

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### Abstract

This paper derives the issues of further research on the farm-type TMR center (i.e., regional farming system) through a literature review. I categorized studies on the farm-type TMR center into the following three types: (1) the farm-type TMR center system, (2) its management, and (3) its impact on members. I organized the trends of those studies by type, further clarified the issues of each type, and presented other research topics by comparing the farm-type TMR center with the similar notion of community-based farming (CBF). The results were as follows: First, researchers did not necessarily have a common understanding of the farm-type TMR center system. Thus, a unified view was necessary. Secondly, funding and labor problems are two management issues of the farm-type TMR center. In particular, the labor problem issues entail a serious situation. Thirdly, early studies showed a positive impact of the farm-type TMR center on its members, whereas recent studies have shown a negative impact. Finally, a comparison with the CBF study showed that the organizational base of the “local group type” of farm-type TMR center was similar to that of CBF, and that the “local group type” could possibly become an entity of community development.

**Discipline:** Social Science

**Additional key words:** dairy farming, farm system agriculture, Hokkaido

## Introduction

Total mixed ration (TMR) is a type of feed intended to increase milk yield, and TMR centers are the organizations that produce it. This paper summarizes research trends on farm-type TMR centers. TMR centers generally produce TMR from grass, dent corn, and concentrate feed purchased from outside. In contrast, farm-type TMR centers are unique in using their own harvested grass or dent corn. In most cases, dairy farmers establish a TMR center and become its members.

Araki (2005) referred to TMR centers that produce silage on a member's farmland as a farm-type TMR center and a type of regional agricultural system, because the farmland is used as a single farm. He valued farm-type TMR centers as a solution to the Japanese agricultural fate of dispersing farmland and the private ownership of machinery. Such centers exist only in Japan (Araki 2005), accounting for 93% of Hokkaido's TMR

centers (Ministry of Agriculture, Forestry and Fisheries 2017).

In 1998, the first farm-type TMR center was established in Okoppe, Hokkaido. Since then, numerous studies have examined such centers, although few do so via a literature review. Therefore, this paper summarizes past research results for farm-type TMR centers, and derives future issues.

I categorize existing research on farm-type TMR centers into three types: (1) the farm-type TMR center system, (2) the management of such centers, and (3) the impact of these centers on members. Then I organize research trends and issues related to farm-type TMR centers based on this categorization. Lastly, I suggest topics for further research by comparing farm-type TMR centers with the similar notion of community-based farming (CBF).

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## The farm-type TMR center system

According to Araki (2005), farm-type TMR centers serve two functions. First, they provide a means of absorbing the farmland of retired farmers. Second, they encourage new entrants into dairy farming. After joining a center, dairy farmers are supplied with feed, and thus need not invest in feed production. Therefore, the initial investment is relatively low, making entry into dairy farming easier.

As mentioned above, Araki (2005) focused on farmland. In contrast, Yamada (2005) focused on the harvest, noting the benefits of farm-type TMR centers. When dairy farmers use machine-use associations or contractors, the issue of timing becomes a problem because it influences the quality of the harvest they receive. A farm-type TMR center resolves the problem by mixing all harvests together, converting the result to TMR, and distributing it to the dairy farmers. As such, Yamada (2005) states that the timing problem does not occur in farm-type TMR centers. Thus, such studies provide positive evaluations of farm-type TMR centers.

Okada (2016) adopts a more cautious view of such centers, however, focusing on the relationship between the center and its member dairy farmers, who purchase feed from the center. Feed costs increase because self-employment costs are externalized. To meet the increased feed costs, dairy farmers must increase their milk yield and number of cows. However, not all have the labor and financial resources to do so, and those who cannot sustain their operations must then reduce the scale of their business or cease dairy farming. According to his research, farm-type TMR centers are therefore designed to promote class differentiation, but do not always support family management.

There are different perspectives. Araki (2005) focuses on the farm system, whereas Okada (2016) examines the relationships between the entities within a farm-type TMR center system. In other words, there is no unified view of farm-type TMR centers and their functions. For example, Okada states that a farmer's feed costs will increase after joining a TMR center, whereas Araki argues that the costs will decrease. Further research is thus required on the functions of farm-type TMR centers.

Araki (2005) notes the similarity between farm-type TMR centers and CBF. A study on the TMR center of an entire village (Kitakura 2008) is related to this point. Hara (2013) created categories called "local group type" and "farmer group type" to classify farm-type TMR centers. A "local group type" is a center where most dairy farmers in the village participate; a "farmer group type"

is a center comprised of volunteer dairy farmers.

## The management of farm-type TMR centers

According to the Ministry of Agriculture, Forestry and Fisheries (2017), the majority of TMR centers in Hokkaido struggle to secure human resources and cash flow, for both the present and the future. Therefore, management research in this context focuses on funding and labor problems.

### 1. Funding problems

Kaneko et al. (2014) identifies three problems with farm-type TMR centers: (1) balance of earnings, owing to non-operating income, (2) a low current ratio and problematic cash flow, and (3) a low capital adequacy ratio, and reinvestment depends on levels of debt.

A further problem is that many farm-type TMR centers are unable to secure reserve funding, that is, internal reserves for machine upgrades and repairs. The primary reason for this is that many centers are managed in a way that does not earn a profit, thus avoiding taxes (Araki 2014). These centers offer low TMR prices to dairy farmers who are also investors. Moreover, the managers of such centers tend to use the depreciation and amortization for debt repayment and wages (Kaneko et al. 2014). Funding problems are also aggravated by the excessive investment induced by subsidies (Okada 2013).

These problems stem from the structure of the farm-type TMR center system, where the relationship between the center and its members is characterized as a trade-off. If the center increases its TMR price, its revenue will increase; however, this will also reduce the income of its members, because they buy TMR from the center. As a result, the members often oppose TMR price increases.

As described above, the funding problems in these centers stem from the system's structure. Therefore, cost reduction is not a solution to the problem, because this will simply induce members to further reduce the price of TMR.

An agreement is thus required to specify how to fund equipment upgrades, as well as a reasonable TMR price. Yoshioka (2007) reports a case where members felt that the TMR price was high, but cooperated with the center's management. He states that planning based on leadership and establishing a consensus at an appropriate time were necessary. He focuses on the agreement necessary when establishing a center. Further research is required on establishing a consensus once the center becomes operational.

## 2. Labor problem

Okada (2016) argues that it would be reasonable for a farm-type TMR center to employ labor or to outsource work. However, doing so entails certain challenges.

TMR centers with few employees find it difficult to secure holidays and substitutes, while those with many employees struggle with recruitment (Kaneko 2014). In recent years, labor shortages have become a serious problem in Japan, making recruitment difficult. By outsourcing work, a center can avoid this problem. Nevertheless, this only solves the problem for the center, rather than addressing the overall labor problem. Thus, further research is required.

## The impact on members

Dairy farmers can increase their milk yield by joining a TMR center (Araki 2005). This increase is realized by two effects: (1) improved feed quality and (2) the creation of time to rear cows. Members entrust feed production to the TMR center. This saves time, which farmers can then use to rear cows and, ultimately, increase their milk yield and income (Araki 2005).

However, these effects do not extend to all members (Araki 2005). Okada (2016) points out that members with insufficient labor, investment funds, and technical skills may be unable to respond to the TMR center system, resulting in a worse management status than it was before they chose to participate.

In order to prevent such problems, Hamamura & Koyama (2019) proposed the following: (1) establish a TMR center among dairy farmers who employ the same rearing methods, (2) standardize the rearing method, and (3) increase the types of TMR provided by the center to the farmers.

## Comparing farm-type TMR centers and CBF

### 1. The farm-type TMR Center and CBF

As mentioned earlier, Araki (2005) points out that the farm-type TMR center resembles CBF in Honshu (main island of Japan). Both are cooperative organizations for farmers.

Nevertheless, there are differences. CBF in Honshu is mainly for cultivating farmers, while farm-type TMR centers in dairy farming regions are mainly for dairy farmers. According to Araki (2005), farm-type TMR centers comprise full-time farmers and are dynamic organizations driven by “management logic.” Conversely, CBF is a static community-based organization, driven by the “logic of community conservation” (Araki 2005), although some types of CBF have become more dynamic,

hiring full-time workers, diversifying their management, becoming incubators of new entrants, and managing welfare businesses. Therefore, it has developed and become a community-building entity.

In Hokkaido, neighboring dairy farmers have thus far absorbed the farmland of retired farmers and maintained the community. However, this mechanism needs to change, given the limited expansion of farm management and limits on local living space due to the country’s declining population (Kobayashi 2018). The development of CBF from farmland maintenance to community development is a role expected for farm-type TMR centers as well in dairy farming regions. It may also help dairy farming in Hokkaido. However, the two systems differ in terms of their (1) organizational base and (2) structure.

### 2. Organizational base

CBF is based on a local community. CBF activities, from farmland maintenance to community development, have emerged as a means of survival for the community (Tabata 2017).

Farm-type TMR centers involve volunteer groups, and are not based on a village. Instead, the organization exists for the convenience of its members. A volunteer group has no obligation to play a role in community development, making it difficult to require the members play such a role.

However, farm-type TMR centers have recently begun to resemble CBF in terms of their organizational foundation. Hara (2013) has reported the existence of “local group type” farm-type TMR centers, where most dairy farmers in the region participate. Another center includes an entire village (Kitakura 2008). There is ongoing research on whether such examples can prove to be the main actors in community development.

### 3. System structure

A farm-type TMR center is responsible for harvests and TMR production, and provides TMR as an intermediate product to its members. Thus, such centers are characterized by a “vertical division of labor in the production process” (Okada 2016, p. 184).

This is clearly different from CBF, which does not provide intermediate products to its members. In other words, CBF is not a vertical division of labor system. Thus, farm-type TMR centers and CBF differ in terms of their systemic structure. Therefore, when referring to CBF research, researchers need to pay attention to the differences in the systems.

## Conclusion

This paper categorized studies on farm-type TMR centers into three types, and compared such centers with CBF.

First, researchers lack a common understanding of the farm-type TMR center system, which creates confusion in any discussion on the topic. Therefore, a unified view on the functions of farm-type TMR center is required.

Secondly, the management of farm-type TMR centers struggles with funding and labor problems. Funding problems stem from the trade-off that characterizes the relationship between a center and its members. Thus, it has been difficult for centers to set appropriate TMR prices and secure internal reserves. In order to deal with these problems, this paper showed that consensus building for management might be a solution. Unlike funding problems, there is no clearly evident solution to the labor problem. This issue must be treated as an urgent issue.

Thirdly, studies have shown a positive impact of farm-type TMR centers on its members. However, negative effects have recently begun to emerge, requiring further research.

Finally, this paper compares farm-type TMR centers to CBF to identify possible future trends and research. In Hokkaido, a new community development mechanism and entities are needed. The organizational base of the “local group type” farm-type TMR center is similar to that of CBF. Therefore, it has the potential to drive community development and CBF. Therefore, the conditions necessary for a “local group type” center to become a community development entity must be clarified.

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