Establishing Process of Milch-Cow-Keeping Region in Northeastern Part of Yonezawa Basin, according to Areal Differentiation of Land Utilization

--- Agricultural Geographic Description of Two Milch-Cow-Keeping Regions (1)

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a) Areal Differentiation on the Pattern of Agricultural Management Type in the Yonezawa Basin

The pattern of agricultural management in the Yonezawa Basin presents a problem of much interest from the viewpoint of geography. That is, as is shown in Fig. 1, many types of agricultural management, sericulture, fruit and tobacco growing, milch cow keeping, and breeding and fattening of labour and beef cattle are arranged around the area of mono-cultural paddy field in the floor of the basin. Some explanation is as follows. As the basin-floor is favoured with conditions for paddy fields, the mono-culture of paddy is managed on large scale, and accordingly the rice is its chief commercial crop. Though in the floor alike, the northern part is provided with natural levees and the sericultural management is carried out, based upon the mulberry culture making use of them, as far as the hilly district behind. In the northeastern part some paddy culture is seen on the brink of Lake Hakuryu which is a part of a waste-filled one, but its chief management is that of grapes on its hillsides. To the south of the area, that is, in the eastern part of the basin, there appears a management combining paddy with pear culture, though in a small area, and in the interior parts of the valley, there is a management of milking, and the sale of milk is the main source of cash income. In the southeastern part of the basin-slope are interspersed such managements as that of sericulture, grapes, apples, pears or other fruits growing, milking of cows, and breeding and raising of cattle for meat and labour. While in the southern part of the slope, tobacco and other industrial crops are stressed; so the pattern of dry field cultivation is to be observed. In the western part of the slope, which consists of hills of low relief, so that paddy culture is widely spread in valleys, the breeding and fattening of cattle for labour and meat are so prevalent that they are noted as “Yonezawa-ushi” (mainly in the case of meat). Moreover, there is an apple and cherry-growing area to the west of Yonezawa City (inhabitants 45,000), and the textile industry on small scale is
flourishing in the city itself. The eastern, northern and western parts of the basin have each a small town of their own, where several industries such as milk-products-manufacturing industry, fruit-tinning industry, silk-reeling industry and pencil-manufacturing industry are sited and form the upper framework of areal structure of land utilization of the Yonezawa Basin.

Such an occurrence and development of the varied types of agricultural management throughout the basin, especially the areal differentiation of the pattern of the types expressed by the pattern of land utilization of the slope of the basin, give some good examples of the other ways of expanding the scale of agricultural management in the areas where physical environment prevents the expansion of paddy growing, though in Japanese agriculture, the paddy culture forms the keynote of agricultural management, and show some adjustments of agricultural management to physical environment. The similar

Figure 1 b) Supposed Schematic pattern of the land utilization in a basin.

The land utilization in a physical region, namely, basin, is shown as a schematic pattern: Forest belt develops in the vicinity of its main divide, woodland belt also develops under the belt. Both belts become wide toward south, especially the latter becomes wider. These two belts are a round the upper slope of the basin, and both lower limits climb up toward north. In the lower slope human activity is very active, especially in northern and eastern slopes. In the southern half of the basin slope land utilization is fairly simple, while comparatively complex in its northern half because it is sunny. In basin-floor paddy field are generally found, and near the outlet of the basin an urban area lies as the centre of its basin, which is the commercial centre, and in which several factories are constructed based upon the primary-order industry of its basin. Such a pattern of land utilization is the result of the influences of the physical environment, and in the ultimate stage of development process of land utilization the pattern will be formed, though incomplete at present.
areal differentiation is observed in the Fukushima Basin and not so clear in the Yamagata, and the Nagano Basins and the Kitakami Valley. Consequently, it may be suggested that the pattern of the types of agricultural management will be formed ultimately in the physical region—Basin.

The process of such development of agricultural management around the Yonezawa Basin is going to be considered from the view-point of stock keeping, though lateral.

b) Progression and Development of Stock Keeping in the Yonezawa Basin

According to the distribution of stock-keeping-ratio in 1925, horse-keeping-ratio shows its higher value 64.3% in the bottom area, and less than 30% in the district from the eastern flat land to the mountainous part and nearly 40% in the most parts of other areas. And in the case of cattle-keeping-ratio, the highest one 65.0% is observed in the eastern mountainous part, some villages in the western hilly part showing 38.4%; all the values are less than 20% in the bottom area, and the areas including no hilly parts all showing very low values.

The Yonezawa Basin was originally an area of horse keeping, and cattle keeping has been begun since the Meiji Era. As a result of encouragement of agriculture with stock raising from the end of the Meiji Era till the Taishō Era, the farms, which had too small arable land to manage to keep horse on, began to adopt labour cattle, and the ones which did not manage enough paddy fields, also changed their stock from horse to cattle, for the essential condition was fairly large an area of paddyfields. For this reason, cattle keeping became prevalent in the eastern mountainous part where there were such small-scale farms, and the eastern cattle-keeping area was constituted in 1925. The western hilly area abundant of grasslands, contains comparatively large management-scale of paddy fields, and needed so much stable-manure of horses to paddy culture that it played a roll of raising horses. However, the combination of horses with paddy culture there, was not so strong as in the bottom area. The paddy fields in the bottom area are much larger in area than those in the western area, and consequently required speedy tillage with horses. On the contrary, the western hilly area had no paddy fields so large and flat as to require horses in tilling, even though the scale on which the paddy fields were managed, seemed large, so that the combination had been only formed through stable-manure and grassland. Consequently it was natural that the change of keeping stock from horse to cattle should gradually begin to take place.

As to milch cow keeping, it shows its highest ratio in the eastern mountainous part, and is found only in the eastern area. The pasturing of
milch cows on the eastern side of the mountain divide was this origin. That is to say, the breeding of milch cows on the slope of Mt. Zao belonging to Miyagi Prefecture, is thought to have moved westward. Some natives of the eastern mountainous slope of the Yonezawa Basin and one of the city-milk distributors in Sendai were engaged in this enterprise. They milked and made butter on the side of Miyagi Prefecture for some time, but, when the factory declined, the natives themselves established a butter-producing factory run on a small scale in 1914 in their own village. This stimulated the farms keeping cattle to adopt milch cows. There was the milch cow keeping by a city-milk distributor at Takahata in 1882, but it had not enough power to urge them to begin to keep milch cows. In 1892 "short horn" breed as milch cow were introduced and those of "Holstein" breed in 1900. However, the purpose was not milking but breeding. About this time, sheep keeping was begun by the sericultural farms in Fukushima Prefecture, for the rest of the mulberry leaves and branches after silkworms raising and excrements of its worms could be made into use by sheep keeping. And milch cow keeping in the same way was also carried out in this area. So the object in this case was to breed milch cows just like that of the cattle keeping around. The milch cow keeping combined with sericulture was very rare in example. It presents a matter of much interest, but did not develop so much. After the factory was constructed in 1914, the purpose of milch cow keeping changed into milking and selling milk. The result was that the object of milch cow keeping changed rapidly from breeding to milking.

Niijuku showed 14.4% of milch-cow-keeping-ratio in 1927, which rose to 19.2% in 1929 and kept 14.9% in 1933, while the cattle-keeping-one of the village fell down to 49.5% from 65.0% and far below to 26.0% suddenly (though the statistical increase of the farms influenced the figure on appearance). For this reason, Niijuku showing the highest value was defeated by Takahata whose ratio was 30.5%. Wada, south of Takahata, let down its cattle-keeping-ratio, which was 37.3% in 1925, then gradually fell down to 17.2% in 1931, in spite of little milch cow keeping. In other words, the cattle keeping in the eastern mountainous area was at its zenith in 1927 and then gradually declined. This is the decrease in cattle keeping, though it was partly transformed into milch cow keeping. In this area, horse keeping also declined. Niijuku which was once the centre of cattle keeping and then that of milch cow keeping, showed 11.6% of horse-keeping-ratio which fell down to 5.2% in 1933. In Wada the ratio fell down to 16.8% from 22.3%. In Nakagawa and Yoshino north of Niijuku, no change was seen in horse-keeping-ratio, but cattle-keeping-one increased about 10% yearly. It shows the development of cattle keeping itself in the northern mountain area. The horse-
keeping-ratio in Yashiro west of Takahata, fell to a small degree to 22.1% from 24.5% between 1925 and 1933, while the cattle-keeping-ratio rose a little from 24.2% to 29.9%, and the milch-cow-keeping-ratio also did from 7.7% to 10.7%. As the exclusiveness of horses, cattle and milch cows was brought into being, the phenomena show the increase in stock keeping. About the same time as was written above (1925–1933), the cattle-keeping-ratios of Tamanishi and Nakatsugawa in the western hilly area rose uniformly every year to 54.7% and 44.7% from 27.3% and 38.4% respectively. On the contrary, the horse-keeping-ratios fell down to 35.7% and 33.0% from 42.0% and 48.6% respectively. The degree of decrease in the horse-keeping-ratios is smaller than that of the increase in the cattle-keeping-ones, so that in this area both giving up horses for cattle and the increase in the cattle keeping by the farms having kept no livestock before, are suggested in it. That is, the area became a cattle-keeping one in place of the eastern mountainous part, and no milch cow keeping was introduced at all in this area. A rapid increase was made in milch cow keeping from 1935 till 1939. The ratio rose to 24.1% in Niijuku in 1937 and to 41.0% in 1939. The remarkable expansion was not done in its environs, only Nakagawa north of the village showing a rising value from 4.4% in 1939. At that time, cattle keeping increased in the eastern mountain area once again. In Niijuku, the ratio rose from 28.8% to 41.3%; in Takahata from 28.5% to 39.0% and in Wada from 22.1% to 31.6%; in the north, Nakagawa from 8.6% to 32.2%; Urushiyama from 10.7% to 33.9%; Isazawa from 9.6% to 39.9%. Thus, cattle keeping increased throughout a large area, and especially in the northern area. There are no statistics on horses except those in 1935, but milch cow keeping did not increase, so that horse keeping is reasonably thought to decrease. And perhaps it is not a wrong conjecture that just as in the previous period, the degree of the increase in cattle keeping is larger than the decrease in horse keeping.

The northeastern hilly area had the horse-keeping-ratios of 40.0% or so in 1925, but gradually decreased until 1933, one of them showing 20.0% or so, and the other 30.0% or so. As to cattle keeping, on the contrary, the ratios amounted to 20.0% or so, rising suddenly from 8 to 10%. In Ringô the ratios decreased in horse keeping, showing an undulating decline movement as indicated by the following values; 44.1%, 43.5%, 36.0%, 40.8% and 38.2%, while the cattle-keeping-ratios showed an undulating increase movement as 5.9%, 4.2%, 6.0%, 5.2% and 10.0%. And this is contrary to the general tendency.

In the floor of the basin, horse-keeping-ratios are 30% or so in its northern part, but in the southern part, as high as 50–60% except 24.2% of
Yonezawa City, and in the southern slope of the basin show 30-50%. The change of these ratios fluctuates every year, but the values are not over 10%. However, in the southern part of the basin-floor and in the southern slope neither increase nor decrease in horse keeping is to be observed clearly. The cattle-keeping-ratio of the same area is very low in 1925, and does not increase except in its western and northern margins even in 1933. But, from 1935 till 1939, the basin-floor gradually shows the increase of less than 10% in cattle keeping, and most of ratios become 20% or so with the exception observed in the northern and southern parts of Yonezawa City. Though no reliable materials were obtainable owing to the lack of the statistics of horse keeping before the War, some degree of decrease in horse keeping can be conjectured in the eastern part of the basin-floor and the southern slope, as cattle keeping increases as above.

From 1947 till 1949 the stock statistics was missing by the War, so the explanation by mentioning figure is prevented. However, between 1935-1939 and 1947-1949, a decisive change was given to both horse and cattle keeping. It was the introduction of cattle in the place of horses which were forced to military service. They decreased rapidly in number in all the areas except those in which horses were indispensable. The horse-keeping areas in 1947 lost some showing 60% —the highest value being 51.9%— and 40% area agglomerates, biased in location to the west in the bottom.

From 1949 till 1953, the milch-cow-keeping areas in the eastern mountain zone made its westward and northward expansion, which shows clearly the post war development of milch cow keeping. In consequence, Nijjuku shows as high a value as 61.7%. As to the cattle keeping of this area, it generally increased except that of the centre of milch cow keeping, especially, to a large degree in the northern mountainous area and the southern part of the eastern mountainous one. In Wada which is situated in the southern part, the milch-cow-keeping-ratio remains as low as 15% or so, while that of cattle keeping increases remarkably, rising up to 57.0% in 1951.

The western mountainous area shows as before its high ratios of cattle keeping, having indicated 78.5% and 83.7% in 1953. On the contrary, the horse keeping declined excessively during the War, the ratio falling down to 18.5% and 18.0% in 1953.

Moreover, it shows a rapid increase also in paddy-and-mulberry combined area covering from the northern part to the northeastern part of the bottom, revealing 60% or so. The result is that Wada aforesaid has been combined with this area by the one lying between, whose ratios are all 40% or so.

Consequently, the horse keeping in this area declines, showing 10% or so in the north and 20% or so in the neighbourhood of the middle part of
Establishing Process of Mi Milch-Cow-Keeping Region

the bottom. There is no place continuing to possess the ratio of 50% in 1953 but one village situated to the south of Yonezawa City. And even in the nucleus districts of paddy-culture to the north and west of the city, the ratio fell down to 40% or so. And on the other hand cattle-keeping-ratios rise to 30% or so, but in 1925, a horse-keeping-ratios were 40–60% and cattle-keeping ones less than 10%, and the present values of over 70%, which are got by summing up both ratios, suggest the progression in stock-keeping farms, considering the exclusiveness of horses and cattle kept.

Thus, within the Yonezawa Basin the differentiation of the variety of stock is to be observed in stock keeping just as was indicated in the types of land use in section (a). That is, as Figure 1a) indicates, each livestock has itself an area of its own; and that the purposes of stock keeping are various according to the types of agricultural management including it.

The stock-keeping-ratio is the lowest in the northeastern area where fruit-growing prevails and is not so high in the northern mountainous part either, where cattle are employed for tilling by farms of smaller management-scale. And in the northern area, paddy-and-dry-field area including sericulture in it, the cattle-keeping-ratio is very high for agricultural labour. In the western slope of the basin whose management-scale of paddy and dry fields is comparatively larger, the object of cattle keeping is rather breeding and fattening than employing for tilling, because of its hilly topography. On the contrary, horse keeping is retained in a relatively high ratio in the western and southern parts of the basin-floor containing in them many farms with larger management-scale of paddy fields, and keeping horses for both raising and tilling. And there is a horse-breeding area in a small part of the southern slope, though managed on small-scale.

Fruit-growing has begun in the eastern mountainous area and its southern part, where sericulture still remains, and milch cow keeping has already been introduced, so that prevalent kinds cannot be observed. But, as milch cow-keeping is stagnant at present, cattle are comparatively many in number.

The southern slope of the basin, except a small horse-breeding area, gives the back to stock keeping and the agricultural management in that area is that of truck farming by growing industrial crops.

c) Agricultural Management of the Mi Milch-Cow-Keeping Region

As was described previously, the milch-cow-keeping-ratio is high in the eastern mountainous area and its basin slope, and this milch cow keeping was gradually transformed from cattle keeping. And horse keeping is observed to remain in the paddy area where the management-scale is larger. On the other hand, cattle keeping soaks into farms whose management-scales are smaller.
Moreover, in both cases of cattle keeping and milch cow keeping, management-scale of the farms has not a different meaning. This was also referred to in the 8th Report.

However, the object of milch cow keeping is different from that of cattle keeping. That is to say, the purpose of the latter is raising cattle for agricultural labour, fattening them for meat, or breeding, and is in accordance with its physical environment. On the contrary the object of the former is milking and calving accompanied with milking. For milking they must be fed with concentrates fed, provender more nourishing than what has ever been given to horses or cattle.

In Japan, in the milch cow keeping around cities, most of its provender, both concentrates and rough fed, were purchased, a very little being the left-over food from them. Afterwards, the farms around took the place of the city-milk distributors, and even then a greater part of concentrates fed used to be bought as it was before, for the left-over of their own was very small in quantity. As raw milk is lower than city-milk in price, and moreover as the farms producing raw milk are located a long way off from cities, their profit becomes undoubtedly much smaller in the same form as the city-milk producers'. If they were in a mountainous area, they might be favoured with the comparatively abundant wild grass in summer time, although it was rough fed. Therefore they required concentrates fed to get milk containing more fat. And consequently, it is quite natural that the cultivation of fodder crops should be adopted on the substance of their management.

The next table shows the results got by striking average per settlement concerning each item, from the data of 20% random sampling of the whole milch-cow-keeping farms in the northern half of the Yonezawa Basin. These milch-cow-keeping farms can be classified into the following five categories;—those in an area where the dominant type of management is milking,
Figure 2: Distribution of each stock-keeping ratio in every year.
those in the one where the pear-growing is interspersed among paddy growing, those in the one where the management of grape orchards predominates, those in a paddy-field area, and last of all, those in the Wada small basin. This classification does not mean that the farms of milch cow keeping mentioned are engaged in each of the above types of management in addition, but what type of management the farms around are adopting. Whether in a pear-growing area or in a grape-growing one, milch cow keeping is duplicated on those managements in nearly all cases, but the data of areas under fruit growing could not be obtained. However, in Tokizawa and Hinata milch cow keeping is not duplicated on the other management at present, although it will be duplicated in near future, for every farm has cleared about 2 “tan” on the hill-side to grow grapes there. Miyabara gives a good example concerning this, because milch cow keeping was antecedent to grape growing.

In the area where the management types are chiefly milking, paddy fields are clearly as large as dry fields in area in a farm. Fodder crops are grown in a fairly larger area, compared with those in other areas. And in some settlements with so small an area of dry fields, they are grown even in 81.7% of them. Moreover, the number of silos is comparatively great. However, as they are of old style, their average capacity is smaller than that of those Wada area. The number of milch cows per farm can be compared to that in the Wada area and the pear-and-paddy area, but a little less than that in the paddy-growing area. Concerning fodder-growing rate, that of dent-corn is 50-80%. Swedish turnip and clover being relatively eminent in their rates. Though Takayasu settlement is situated near the milk manufacturing factory, sericulture was prevalent only a few years ago, so that there are few silos, and consequently dent-corn is not grown so much.

In grape-orchard area, fodder crops are raised only in a small area, even in such old milch-cow-keeping settlements as Miyabara, Tokizawa and Hinata. This is probably because of their small area of dry fields. However, the chief reason is that as the managing scale of paddy field is larger than that in the milking area, the stress of management is laid upon rice cultivation, and milch cow keeping is not the substance of its farm management, though it was begun comparatively earlier. Especially, the one in Akayu and Kanazawa is a mere addition to the management of grape orchard.

Pear-and-paddy area lies near the valley mouth where the milking area is led to the basin floor, and fodder crops are not grown in so large an area, although it is not favoured with glasslands. In the Takahata area, the dry fields were converted into the pear orchard in the early period of pear culture, and then paddy fields were, so that milch cow keeping does not occupy a main
position in management, though superior to that in the grape-growing area.

Different from the mono-cultural paddy area in the southwestern floor of the basin, the paddy-field area possesses natural levees. And as they are farmed into mulberry plantations except those in Kunugizuka near Akayu, an area of dry fields is rather small. On the contrary, the management-scale of paddy field is much larger compared with that of other areas and consequently the management there seems to be carried on without so much difficulty. So the number of milch cows per farm is more; and moreover labour cattle
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are kept; and silos are also possessed.

The fields in feed crops are smaller in area in Fukanuma and Kunugizuka, while they are larger in Yoshijima and Komatsu. In the vicinity of the former settlements, the mulberry fields were changed into dry fields, and afterwards apple farming was introduced. The change in management took place successively as above, and the farms keeping milch cows are now on the point of giving up the dairy cattle. Therefore, the form of milch cow keeping in this area will be the same as that observed in the core area of
the grape-raising one. In the former area, the conversion of the mulberry fields into the apple orchards was carried out after the War. In the Yoshijima and Komatsu areas, milch cow keeping was begun rather earlier, and there is no room for the others to enter. However, those who adopted it earlier, were agrarians of progressive spirit at that time, and they still believe it to hold an important position in the management. On their farms a fairly large area of fields is seeded with feed crops. But the crop rate is different from that of other areas to a large degree, because there are wheat or barley for ensilage managed conspicuously as a form of the second-crop of paddy fields.

The small basin of Wada has both dry and paddy fields, which are larger in area than those in the milking area. Though feed-crop rate has not yet risen so high, yet more silos are installed; more milch cows are kept in this area; and especially it is worthy of note that Swedish turnips are grown in higher rate. As was mentioned above, no differentiation of agricultural management has not been accomplished, and other various types co-exist, interspersing with one another, or going their own ways. The milch-cow-keeping farms, too, exercise their managements themselves as well as, or better than in the milking area.

To sum up what was written above, it is as follows: In the core area of milking the dry fields are smaller in area, but 30% to 40% of them are in feed-crops. These values of the cropping rate, though they are very low as compared with foreign values, are yet far larger than those of the M3 region, to which a description will be given in the next article showing that its cropping rate is collectively higher than any other area in Japan Proper. However, there are only a few settlements in which feed-crop fields amount to 20% of their whole arable lands, and the paddy fields, 50 to 70% of the lands, are still highly evaluated as a chief and important base of their agricultural management. As to the milch-cow-keeping section in the areas of other management types, the feed-cropping rate is much lower. These facts suggest that even in the areas where milch-cow-keeping farms are collectively situated (milch-cow-keeping regions), the weight of agricultural management is given to subsidiary-cereal-farming, and that milch cow keeping is regarded only as a subsidiary one. In other words, cereal-farming is carried on with self-sufficing economy as its centre, and consequently, milch cow keeping can not be concluded to have fused into the whole management of agriculture, though exercising some influence upon it in the dry-field area. The form of stabling in milch cow keeping, having no pastures, cropping few feed and purchasing concentrates fed, mean nothing but a way of changing the surplus labour of their families into cash through milch cows, and it may be reasonably concluded that milch cow keeping is placed only
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...in such a minor position in agricultural management, even in this region - one of the typical milch-cow-keeping regions in Japan Proper.

Notes and References

(3) Author's 9th Report: pp. 99. And it will be discussed again in detail at the next article.
(4) Author's 10th Report: p. 4 and Fig. 2
(5) This increase does not mean the increase of farms by reclamation, but the change of standard, by which the branch authority takes up farm-enterprises as statistical units.
(6) Author's 8th Report: pp. 7-9
(7) In 1910 the milch cows of "Holstein" breed were introduced in this area, but were disappeared because the farmers had no route of milk-selling and could not use them for agricultural labour. Before 1919 few labour cattle of mixed breed were kept. And in 1919 the cattle of the Improved Japanese breed (black hair type) were introduced from Tottori Prefecture in the cattle-keeping region, the Chugoku Districts, and in 1930 many cattle of same breed were introduced, and consequently, in this area the breed has become a dominant kind.

Author's Literatures


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