

Some Relations between Physical Environment and Social Ones from the view-point of the Geographical Study of the Milch Cow Keeping

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Preface

Not a few studies were already presented with respect to the origin of domestic animals, their relation with human races and their distribution and propagation, etc.,⁽¹⁾ and there are so many studies on livestock-keeping regions where the weight of managements is given to stock keeping.⁽²⁾ And the facts discerned through these studies are for a physical environment in an area to reflect the livestock in that area, whether the stock is inborn to a race or not. Namely, it is found that the stock have relation to climate—especially, dryness and temperature—and to topography in relief. However, it is only in the area outside the limit of tillage that such a response is easily and clearly found. It is thought that the response is not an immediate one in the regions within the limit of cultivation where the climate is not so cold and dry. In the regions near the limit of crop-farming, there appears a type of stock keeping in which an equal weight is given to cereal farming in farm management. Such relations will be shown in Figure 1 as a schema. In both cultural spheres of Europe-America and Asia-Africa, in the areas out of the limit of cultivation owing to dryness are observed human activities in which livestock keeping is stressed. On the contrary in the areas near the limits, which are pushed out by their climate—cold and dry, dairy farming and transhumance are shown in different parts. Above all, transhumance is more prevalent around the Mediterranean Sea than in any other area.⁽³⁾ Essentially, this is a combined type of nomadism and cultivation. But the great scale transhumance of the Mediterranean region is an extremely developed one which has the management-scale and the management-system as similar as that of ranching, namely commercial grazing.

On the other hand, in respect to the livestock within the limit of cultiva-

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- (1) Giichi Kamo: Cultural History of Livestock. 1934. (in Japanese)
Karl Sapper: Verkehrs Geographie
E. Werth: Zur Verbreitung und Gesichte der Transport-tier. Zeits. Gesel. Erdk. Brln., (1940) S. 181-203.
Toshio Noh: Carl Sauer's Theory on the diffusion of domestic fowl into the New World. Studies in Arts & Cult., Ochanomizu Univ., vol. 4 (1953) pp. 17-23.
- (2) Many text-books of Economic Geography.
- (3) E. Müller: Die Herdenwanderungen in Mittermergebiet (Transhumance). Pet. Geogr. Mitt., 84 (1938), S. 364-370.

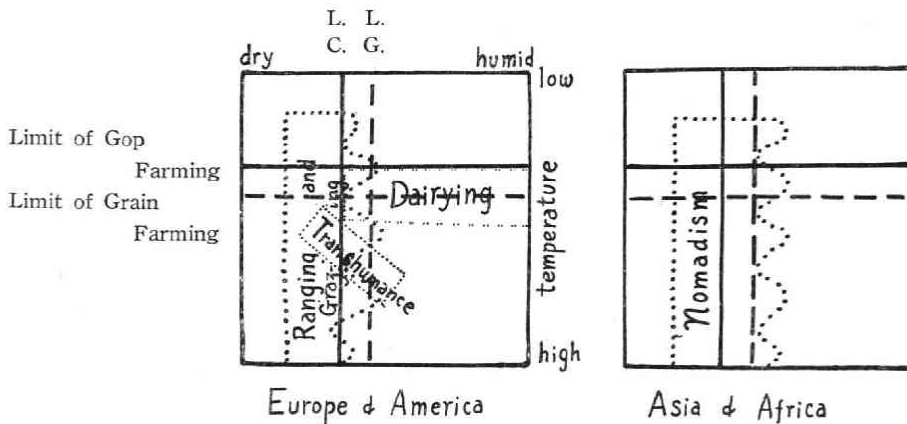


Fig. 1 Fundamental relation between physical environment, agriculture and livestock keeping form among the two cultural spheres.

tion there is not any geographical study which has chiefly aimed at livestock; they are only treated with partially and shortly in the descriptions of regional geography, agricultural geography and landscape geography of various districts.⁽⁴⁾ But the swine keeping in the corn belt of America is an exceptional one and several studies on it were published⁽⁵⁾, because the keeping has a special form. From these literatures, the livestock kept in farming areas are chiefly intended for tilling, drafting, or meat supplying. And there are many varieties or kinds of stock kept according to the variation of the purpose of keeping and the implements for agricultural labour. Moreover, they determined the kinds of stock by a religion in some area. However, it is thought that the varieties or kinds have some relation to physical environment.

A relative difference in physical environment is observed even within a farming area. Indeed, livestock are kept in response to climate and topography as the buffalos in the tropic region and the goats in the mountainland of the central Asia. But generally, social environment seems to exercise a stronger influence upon stock keeping than physical one, for the latter is reflected on the varieties or kinds through agriculture as a filter. It is a matter of course that the minute difference of physical environment does not seem to effect the varieties or kinds of stock whatever, because the latitude of their existence is excessively wide. But if they are observed more closely, the adjustment to

(4) These are some of which have comparatively many description with livestock keeping in many articles and books.

W. S. Woytinsky & E. S. Woytinsky: World population and production—Trend and outlook. N. Y. 1953. pp. 630-681.

J. F. Cox & L. Jackson: Field crops and land use. N. Y. 1942.

(5) *ibid* (2)

physical environment can be found in the creation of new varieties by breeding. This adjustment is equal to the influence of physical environment. Consequence of physical environment can be considered from the view-point of the variety of stock. But there are few regions which have created new varieties and have fixed them. Most of the districts always possess no stock completely adjusted to the physical environment in each area. Therefore the author tries to analyse not microscopically but macroscopically the distribution of livestock and of their keeping forms, the influence of physical environment and the degree of the influence of social environment upon them even though they are presented through a filter, namely agriculture.

In Japan, the chief area of his study, it has already been described by a number of scholars since E. C. Semple did⁽⁶⁾, that the stock is remarkably few in number, and that few farms keep stock either. And that, such state has been a character of the Asiatic subsistent agriculture.⁽⁷⁾ However, within Japan proper where the subsistent agriculture is typically and intensively developed, the distribution of livestock, though small in number, is observed to show areal biases according to varieties of stock, and a kind of stock has been kept in comparatively recent days.⁽⁸⁾ The variety or kind of livestock in the area where less stock are kept is supposed to be more liable to be influenced by a slight difference of geographical environment—physical and social, than that in the area⁽⁹⁾ where stock have been kept densely in a large area.

Especially, milch cows are one of the livestock that have an essentially different culture in their back ground and there are two forms of its keeping, the one is intended for supplying city-milk and the other raw-milk. Therefore the author has tried to analyse the livestock keeping geographically, laying accent on it in expectation of the possibility of finding the influence of the geographical environments the more clearly for the above reasons⁽¹⁰⁾

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- (6) E. C. Semple: The influence of the geographic conditions upon Japanese agriculture. *Geogr. Jour.*, 40(1912), pp. 590-600.
G. T. Trewartha: *Japan*
A. J. Grad: *Land and peasant in Japan*. Int. Secr., Inst. Pac. Rel., 1952 (translate into Japanese. 1953 Tokyo)
- (7) D. Wittlesey: Major Agricultural Regions of the World. *Ann. Ass. Amer. Geogrs.* Vol. 26 (1936) pp. 199-240.
J. E. Spencer: *Asia—east by south*. N. Y. & London, 1954.
- (8) Author's 1st Report and 6th Report
- (9) Recently an excellent study has been published, that is:
Donald L. Mighel and John D. Black: *Interregional Competition in Agriculture—with special reference to dairy farming in the Lake State and New England*. 1951.
In such densely-keeping, homogeneous and broad dairy region the influence can be evidently discernible from the location beyond the physical ones by their method of the analysis of agricultural management.
- (10) In Japan milch-cow keeping is not developed so popular that the similar study by the method of Mighel and Black has not an important meaning yet.

and pursue the relation between physical and social environments through the medium of milk cow keeping.

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Part I

Transformation of the Significance of the Physical Environment in the Development Process of the Livestock Keeping in the Tohoku Districts in Japan

1 Development Process of Horse Keeping

Observed from the viewpoint of topography, the Tohoku Districts are generally abundant of gentle slopes except in the Oou Mountain Range:—Especially the Kitakami and the Abukuma Mountains have retained in their various parts the flat surfaces, remnants of uplifted peneplain, and in their east coast several wide marine terraces are developed; and even in the central mountain range there are many fans along its both piedmont and a number of volcanic cones on its range with their wide-stretched pianos around. And in the western half there are comparatively low mountains, and among these lie fairly large alluvial plains and several small intermountain-basins of low relief. Such flat surface and low relief topography undoubtedly gives favourable conditions of location for pastures. However the stock keeping in Tôhoku is not primarily decided only by these physical conditions, for as the author noticed in the preface, the stock keeping in Japan depends upon agriculture.

Consequently, the stock keeping in the Tôhoku Districts can not be considered without taking into account the development process of agriculture. And the problem as to how the stock-keeping regions come into being can not always be solved only through the observation of the present physical environment and agriculture in its area. That is to say, the transition of stock keeping accompanied with the development process of agriculture, and the role of the physical environment played in each stage—these must be grasped clearly in order to solve the problem.

a) *First Stage* The Tôhoku Districts was exceedingly late in agricultural reclamation on account of its handicapped cold climate and its site distant from the cultural centre of Japan. As, even in the plains, agriculture was not easy to be carried out, it can, without difficulty, be supposed that the districts with such topographic conditions were like a paradise for horses. Until the latter period of the Heian Era, the utility of horses as a labour-stock for agriculture being disregarded in this districts, horse keeping had been done for the purpose of meeting the demand of more cultural districts; the purpose being by free-grazing through the year.⁽¹¹⁾⁽¹²⁾⁽¹³⁾ In such stage when the Tohoku

(11) Author's 1st Report pp. 745-746.

(12) Author's 2nd Report pp. 561-563.

(13) Kahei Mori: Agricultural management and their organization in Oou Districts in Tokugawa Era. 1953 (in Japanese) pp. 11-45.

Districts were forced to be outside the limit of agriculture, or at least in the pioneer fringe, owing to the climatic repression and undeveloped-agricultural technique, the natural equipments of this districts is much more favourable than that of the others in horse breeding. Now this excellent point is just the same in character as those observed in nomadic regions or commercial grazing regions outside the limit of cultivation.

b) *The Earlier Period of the Second Stage* Rice cultivation having the tendency creeping up to the north, gradually began to encroach upon the plain areas of this districts after the Kamakura Era. However unstable the management of rice-growing might be, the fact suggests the loss of the efficient power of the natural environment for grazing horses. That is, to keep the soil-fertility of rice-fields, the grassland was sure to be needed in comparatively adjoining places with the result that the wild plains lost its value as pasture and accordingly the horse-grazing areas were pushed outside the limit of paddy-rice-growing ones. In other words, the free-grazing region in "the first stage" retreated toward the interior of the mountains or the parts farther north, becoming contracted.⁽¹⁴⁾⁽¹⁵⁾ Moreover, as the paddy-rice growing made a gradual progress, the knowledge of making use of horses for tilling was introduced and the form of horse keeping for agricultural labour began to be brought into being in these districts.

In the nucleus districts of Japan, cattle is used in close connection with the management of paddy-rice growing, but the stable-manure of cattle is late in fermentation, with delayed effectiveness. On the contrary, horses give the stable-manure which is fermented and effective more quickly.⁽¹⁶⁾ In this respect horses are almost indispensable in Tôhoku where spring comes round later. Consequently it is quite natural from the view-point of climatic conditions that the combination of horses and the management of paddy-culture should appear in the Tôhoku Districts, such phenomena being unable to be observed in the nucleus districts of Japan.

c) *The Latter Period of the Second Stage* It took quite a long period for paddy fields to develop in Tohoku. It was in the beginning of the Tokugawa Era that they covered almost all parts of the districts. As the paddy agriculture made such a progress, horses were demanded more and more. However, the areas where the horse grazing was carried on in the first stage, kept on retreating to the interior until they were contracted in the moun-

(14) Author's 2nd Report pp. 561-563.

(15) *ibid* (13): pp. 27-32.

(16) *ibid* (13): pp. 242-246

Author's 9th Report p. 99.

(17) *ibid* (13): p. 268.

tainous parts and the northeastern tableland. Accordingly, it is obvious that the old extensive form of horse-breeding in such a state was insufficient to meet the newly growing demand without being replaced by a more productive mode of breeding. The time can not be clarified when the change took place,⁽¹⁷⁾ but the following explanation may be possible⁽¹⁸⁾⁽¹⁹⁾.

The farms outside the limit of paddy culture were in the mountainous parts suitable for pastures and had been enjoying the gaining position in physical environment to breed horses by means of grazing; especially from spring till summer vigorous growth of grasses helped them to graze quite a large number of horses. Deep snow, however, forced them to decrease the horses in number. On the contrary, the farm engaged in paddy-growing in the flatland needed horses for agricultural work only a short time and accordingly, keeping them in the stables through the year was unnecessary—especially the stable keeping was a disadvantageous one from the view-point of division of labour owing to the necessity in daily gathering of grass. However, was winter this was not a burdensome task because they had enough fodder to give, such as straw and many kinds of husks. That is, the quantitative relation between the fodder in pasture zones and that of paddy zones in the plain became completely reversed. Hence arose a new type of commition of horse-keeping from one zone to the other as the suitable season came round. In other words, the farms in the mountainlands enlarged their management in summer by having under their charge the horses from those of the plain and reduced it in winter by leaving their own under the charge of those of the flatlands. The farm in the lowlands, on the other hand, made the most of them in getting enough stable-manure and saved their labour to be spent for horse-keeping in summer when it was far more needed.

This phenomenon signifies the division of labour in horse keeping, and the differentiation of keeping-form between paddy areas and mountain-pasture ones.

d) The Earlier Period of the Third Stage According to the increase in population in the middle part of the Tokugawa Era, grasslands were encroached upon by arable land and enforced to be left only on the mountain-sides and in the mountain themselves which were then impossible to be cultivated. And newly increased farms, in general, managed them on small-scale, most of them, accordingly, having no grassland of their own.⁽²⁰⁾ It is a matter of course that other farming families than such branch ones were also under social and economic condition to reduce their managements,—this is thought to be one

(18) Author's 5th Report pp.55-59 & pp.61-63.

(19) *ibid* (13): pp.268-283.

(20) *ibid* (13): p.159.

of the causes which brought horse-tenancy-system into being—and the fact suggests the increase in the farms which had the difficulty in keeping horses. Moreover, the commercial fertilizer which had been used since the Tenpō period made stable-manure of horses less useful. Thus the close combination of paddy management, grassland and horses became loosened. Especially the importance of grassland was lessened; the grassland in the plain was gradually brought into arable land and was even planted in some parts.⁽²¹⁾ That is to say, it is a characteristic tendency that the agricultural management begun to appear, being free from the control of physical environment, especially climate and topography, which had controlled the management through the location of grassland. In other words, these means that the stratification of feudal society begun to exercise a stronger influence upon agricultural management than physical control. However, in this stage the areal division of labour and the areal differentiation still remained in their complete form and rather developed the more because they were stimulated by the stratification.⁽²²⁾

e) The Later Period of the Third Stage Even when agricultural technique progressed, commercial fertilizer was easily utilized and the contraction of management-scale was continued, cattle keeping could not be easily introduced into the Tōhoku Districts. Even in the Meiji Era when the government encouraged horse keeping, the farm which could not essentially afford to keep horses from the view-point of their management scale, continued to keep them in spite of the difficulty in management, supported by the division of labour observed in the previous stage. However, the farm having no livestock which had increased began to keep cattle at last. Meanwhile, cattle keeping had been begun in some parts, but it had not yet become a general tendency. In the Meiji Era, however, the purpose of cattle keeping for meat was added to that for labour, which brought about an excessive change in economic value of cattle and horses.⁽²³⁾ Accordingly, as the cattle which endures fodder inferior in quality and less in quantity were profitable to be kept on the small-scale farms, the farm which had kept horses despite of the difficulty begun to use cattle in exchange for horses. Such invasion of cattle has continued until present, and increased its speed every several times as the policy of encouragement was put into practice. However some large-scale farms remain as horse-keeping ones, for they lay stress on the speed of tilling and conveyance, and the quantity of stable-manure. In this way horse keeping is retained as it was, only in broad paddy-field areas. And as the absolute

(21) Kosuke Murata: Growth of Landscape in Middle Area of Kitakami-river Lowland. Ann. Tohoku Geogr. Ass. Vol. 7 No. 2 (1951) pp. 3-10. (in Japanese)

(22) Authors' 5th Report p. 55 and its literatures

(23) Author's 1st Report p. 746.

number of keeping horses became less, the farmers in the mountain-pasture zones were also obliged to diminish the management-scale of horse keeping. This signifies not only the reduction of horse breeding of an individual farm, but also the contraction of horse-breeding areas into some parts most favourable for pasture in location. As a result of the contracted concentration of horse-keeping areas of the two types, raising and breeding, in parallel with the development of cattle keeping, the division of labour in the previous stage gradually disappeared. Meanwhile sericulture had been introduced in the middle and the southern part of Tôhoku, succeeding to the exploitation of paddy-culture.⁽²⁴⁾ However, the industry had had nothing to do with stock-keeping until this stage. In this period when silk had become the principal article of export, the farming-households engaged in sericulture appeared concentrating gently slope of piedmont, and hilly lands, uncultivated fans or natural levees, which were all favourable to plant mulberries on. They were, of course, engaged in paddy farming also, but on a small-scale management on account of topography, many of them having no stock of their own. And accordingly the mainpoint of their management had to be laid on sericulture. However, owing to the fluctuation in the price of silk, they were often attacked by economic panics. The result was that the management combined with stock was encouraged, in which the fodder such as restfeed and excrement of silkworms could be used. So sheep keeping became introduced chiefly among the farmers.⁽²⁵⁾ That is, the sheep keeping combined with sericulture was begun in the later period of Meiji Era, and it was the embryos of the sheep keeping areas of today.

To summarize above until the 3rd stage, the horse keeping in the Tohoku Districts took a form of "breeding by pasturing"; in the first stage—an agriculturally undeveloped stage—the keeping supported by the physical environment, especially by the favourable conditions of the location of pastures; and a cold climate was an indirect supporting condition through the undeveloped technique of agriculture. Since the introduction of rice cultivation, horse keeping was differentiated into two forms; one appeared in the mountains and the other in the flatlands. The former is the form of "free grazing through the year" and the latter is the one of "winter-stable-keeping and summer-mountain-grazing". And such an areal differentiation depends wholly upon the differences of physical environment. That is to say, the pastures in flatlands changed their value into the grassland combined with rice-field management. On the other hand the significance of the physical environment of mountainland for horse breeding was not changed, as it was outside the

(24) Author's 12-1st Report pp. 89~95, & 12-2nd Report p. 112.

(25) Author's 12-2nd Report, p. 112.

limit of paddy-culture. Consequently, any change did not take place in the form of horse keeping, either. However, in the later period of the second stage the areal differentiation of horse-keeping-form was transgressed into the areal division of labour, which in the earlier period of the 3rd stage developed remarkably. The change in the form of horse keeping in the period was based on the difference of the quantity of fodder resulting from the areal difference of agricultural management, the influence of physical environment being only expressed through the form of agricultural management. In the 3rd stage the ligament between horse and paddy fields caused by climatic environment was weakened on account of the progress of agricultural technique; farms possessing no livestock in their management appeared, and then cattle and sheep keeping penetrated into the management of such farms of small-scale. Thus in accordance with the contraction of the horse-keeping areas in plains, the horse breeding ones in mountainlands also reduced themselves. In other words, the farming families in the Tôhoku Districts compelled to keep horses by climatic environment were freed from the control of the environment as the technique made a gradual progress, and the areal division of labour in horse keeping changed into the areal differentiation of horse, cattle or sheep-keeping, in response to topographic environment classified more closely.

2 Development Process of Cattle Keeping

Cattle keeping was commenced in the third stage of the development process of horse keeping above mentioned, but there was another development process of cattle keeping quite different from it. The process is observed in the present cattlekeeping regions of the northeastern part of the Kitakami Mountainland. These areas, though the detailed facts were already described⁽²⁶⁾ are the most dessected part of the uplifted Kitakami peneplain, in which the small patches of flat surfaces of its remnant were retained, and there are not any broad pasture for horse grazing. The valley walls are very steep and the bottoms are very narrow. That is, there are no topographical conditions favourable for horses to be kept, and therefore it is supposed to be an area without any stock in the first stage of the development process of horse keeping. Even in the second stage, such topographic conditions of valleys prevented it from being cultivated into paddy fields.

Furthermore, climatically, paddy cultivation was more unsuitable, because the area was and is attacked by "Yamase" (NE)-wind, which is regarded as one of the most powerful causes of the cold-damage in the Tôhoku Districts. As the paddy fields are not to be found in this part even at present, they were

(26) Author's 12-2nd Report pp.100~104.

sure to be far larger in area in former times. Accordingly, it is evident that there was no necessity for keeping horses in the second stage.

Presumably in the later period of the second stage, the production of salt was begun along the coast, and manufacturing iron from mountain-iron-sand also set to work. In order to carry these products and both faggots and charcoal for fuel of these industries. Consequently, some pack-animals were needed.^{(27),(28)} If the engineers of iron manufacture come from the Chugoku Districts, they must be brought cattle with them; if not, the roads were too steep to use horses for the purpose of transportation, and cattle are thought to have been only animals to be kept, for it is able to carry such burdens on such roads. Thus cattle keeping appeared at the time in the dry-field area of the Kitakami mountainland to raise cattle for transportation. Throughout Tôhoku in those days cattle were demanded only in this part and by the mines in other parts, but not as ones for agricultural employment. And therefore the cattle keeping in this area was for the purpose of supplying the pack-cattle and producing stable-manure for dry fields.

Until the earlier period of the third stage, cattle had been kept in the form of grazing them on each small patch of flat surface in summer and keeping in stables in winter, when they were not employed for agricultural work. Therefore the agricultural management of this area was enlarged by cattle keeping without putting pressure on its agricultural labour, from the result that the physical environment was used advantageously for the keeping. Though a tenancy-system was brought into being after that time in cattle keeping, the relation to the physical environment was not changed.

In the latter period of the third stage, the iron-manufacture and the salt-production both disappeared. That is, as the most powerful source of demand was extinct, the purpose of keeping cattle was lost as the result. However just at that time cattle happened to be newly demanded for agricultural purpose within the horse-keeping regions. Therefore the old purpose of cattle breeding in this area was turned to the new demand. Consequently, the keeping was continued as ever. Meanwhile the cattle for meat began to be demanded, which gradually made the area adopt another breed—"short horn"—for both meat and labour.⁽²⁹⁾ In this period, sericulture, too, was popularized so far in this district, but had nothing to do with the cattle keeping in the respect of

(27) Author's 2nd Report p. 572 and *ibid* (13): p. 79.

(28) The Author: Survey of Iron-slugs in Old Days, Hyogo Prefecture Ann Tohoku Geogr. Ass. Vol. 8 No. 1 (1955) pp. 28-31. (in Japanese)

(29) Author's 2nd Report pp. 571-572, p. 574, 10th Report p. 16 and 12-2nd Report p. 111. S. Hirono: Transition of cattle-breeding form in mountain-dairy farming in Tohoku—Through the Agricultural land Reform. Agr. Econ. Vol. 19 pp. 15-20 (in Japanese)

labour-distribution. Sheep keeping was begun later by the farm accompanied with sericulture, so that the management became the more diversified for that being no relation to the cattle keeping.⁽³⁰⁾

In a brief time after the introduction of "short horn" breed, the Horstein breed came to be kept.⁽²⁹⁾ Such change was caused by the voluntary selection of the landlords ("Jito" in Japanese in this area) enjoining feudal power. The selection had only a meaning as their image and it had not any inevitable condition, physical or social, beyond the law of comparative advantage. However, once such selection was executed, the farmers within range of their influence were obliged to follow their examples as a result of the special social-organization.⁽³¹⁾

Accordingly the milch-cow-keeping region is regarded to have been formed not by the inevitable due to the physical environment but an accidental necessity of the social environment. However, the purpose of such milch cow keeping was not for milking but supplying but supplying milch cows to the city-milk distributors around the cities throughout the country; its form of keeping was, as in the case of the cattle breeding, that of depasturing in the grasslands of mountain-tops from spring till autumn and keeping in the stables in winter.

In short, until the end of the third stage the first form of cattle keeping continued throughout the stage, making the best of physical environment, though the purpose of breeding was changed. And a development was intended in the system of agricultural management qualitatively through the following process—from meat cattle to milch cow or intensively to cattle added by sheep.

3 After the Beginning of Milking on Farm

f) *The Earlier Period of the Fourth Stage* The city-milk distributors were keeping milch cows around the cities and towns for the purpose of milking from the middle till latter period of the Third Stage. And gradually the farms around the cities, too, began to take part in keeping milch cows.⁽³²⁾ However, in Tōhoku, such a general tendency can be observed to come much later, for city-milk was not demanded in the districts.⁽³³⁾ This phenomenon may not be explained only by the quantity of the city-milk demanded; it may probably suggest the conservatism of the farmers in Tohoku.

The milch cow keeping without any intensification of milking was already

(30) *ibid.* (25)

(31) Author's 2nd Report p. 575, and 12-2nd Report p. 104 & pp. 122-127.

(32) Author's 7th Report pp 2-3

(33) Kojiro Sato: Dairy farming in Sendai and its environs. *Agr. Man. Tohoku*, No. 4(195) p. 26.

mentioned, but there were other forms different from this. One of them was a milch cow keeping by grazing in the horse-breeding regions, the other, as a one by stabling in a part of sericultural area, having taken the same role as that of sheep keeping accompanied with sericulture. All these forms of milch cow keeping had a potential significance of producing milk, so that it is quite natural that the desire to produce milk-products should take its form in the areas where the milch cow keepers thronged as they began to be demanded more and more in urban areas. Consequently, as such a state of things happens, they try to invite from advanced areas or build for themselves a milk-products manufacturing factory. Thus a factory run by themselves was built in Kuzumaki and one by a central capital in Iwaizumi in the northeatern part of the Kitakami mountainland. And about the same time, Kaminoyama in Yamagata Prefecture had one run on a central capital and Takahata a self-sustaining one.⁽³⁴⁾

i) In the case of the milk-cow-keeping areas of the north-eastern part of the Kitakami mountainland. When the factory was established, every farm keeping them could not pasture on account of daily milking and was obliged to keep them by complete stabling. As more profits were brought to them by selling milk they became milking farms, by force of the circumstances of having since kept milch cows and by the oppression of the retained organization of feudal society. However, from another point of view, this resulted in much more labour in gathering grasses daily, though mere milking increased a little labour. This means that their labour which was completely spent in summer in dry-field management and in sericulture, was further demanded for gathering grass.

It was evident that they had no more surplus labour enough to meet such requirement. Therefore, even though the factory was established and milking begun, many farms milked during the winter stable-keeping time and grazed during summer, and some ceased milking and went back again to the old way of keeping on the pretext that the calves fed with skim-milk grew to be of inferior quality.⁽³⁵⁾ These phenomena give a clear explanation to the fact that the mode of agricultural management including in it milch cow keeping by pasturing in summer and stabling in winter was well suited to the physical environment of the area. Considering from the view-point of factory-management, however, this was not, of course, a welcome phenomenon, as the quantity of milk gathered fluctuated excessively. Therefore, the factories made propaganda for the necessity of stabling as a means of leading dairy-

(34) Author's 10th Report pp. 8-11, pp. 16~18 and 7th Report pp. 12-13

(35) Author's 10th Report p. 16.

farming. The fruitful result of the propaganda and the charm of monthly cash-income made the milking-farms 'give up sericulture which was in competition with milch cow keeping in farm-labour. That is, re-simplification of the diversified management-system was brought about with the result that the two regions—milch-cow-keeping region and sheep-keeping region were clearly divided. However, these milking-farms could not help possessing small patches of farm-fields in the bottom of the narrow valleys owing to the handicaps of their topography, and consequently could not produce even their staple food enough to support themselves, not to speak of growing fodder-crops for milch cows.⁽³⁶⁾ And they were obliged to buy almost all their concentrates fed to milch cows. Moreover, most of their income were only got by selling milk, and the stable manure, which was produced the more for the all-year-stabling, was too much for such narrow fields to be used in, and had no potential fields topographically that would spend the rest of stable-manure. That is to say, the milch cow keeping can effectively contribute to nothing but farm economy.

In other words, the small flat surfaces retained on the mountain-tops had lost their value because of milking and stabling, though they provided favourable conditions in breeding and raising cattle and milch cows by means of grazing. In addition, the flat surfaces were too distant and too steep to climb in utilizing them as grasslands, except only a few made use of as pastures where some cows having ceased milk were pastured, and most of them were abandoned or planted. The grasslands on valley-walls were very small in area, having never been manured before, had not good grass-growth. And consequently, such a big type of milch cow as Horstein-breed which need more fodder was not suitable to be raised in this area. In short, the milch cow keeping in the area can scarcely be considered to have any favourable conditions, so far as it is included in the present way of agricultural management, because the purpose of the keeping had been changed from breeding to milking by social environment and pursuing profits.

ii) *In the case of the milch-cow-keeping region of the northeastern part of the Yonezawa Basin.* In this area, milch cow keeping was begun in accompaniment with sericultural management, and about almost the same time the pasturing of milch cows was also commenced in the pasture on the slope of Mt. Zao on the eastern side of Miyagi just over the divide. Their purposes were all to breed milch cows. Especially, as the latter one was under the management of the city-milk distributors of Sendai, they built a factory quite earlier and began milking, but the place was too distant for them to

(36) Author's 12-2nd Report pp. 112-121.

supply city-milk; the quantity of milk gathered was too small, and in addition to them, the market of its product was not stable. For these reasons, it disappeared in a brief period. About this time a factory run on a small-scale was established between both the areas, and it continues to exist till now.⁽³⁷⁾ Since the establishment of this factory the major conditions of location for the milch cow keeping became valueless just as in the case of the previous section except the fact that the pasture was used as grassland so the keeping soaked into the farms surrounding its pasture hereafter. As to the milch cow keeping combined with sericulture, it was adopted only by a small number of farms. But the farms in this area had already given up horse keeping for cattle breeding. In such state the factory was built and began milking, so that the farmers changed their stock-variety from cattle for labour and meat to milch cow breed.⁽³⁸⁾ For this reason, the factory itself moved westward to the centre of the newly enlarged milch cow keeping area. When fruit growing was introduced along the mountain foot, milch cow keeping was not enlarged in competition with the newly adopted agriculture, nor it declines, but developed into the interior mountaineous parts, to the contrary. The milch cow keeping accompanied with sericulture was combined with it in the respect of provender, but the cord was comparatively a weak one. The daily labour of milking added by adopting it was not so strong a pressure as to cut off the cord but the mulberry plantations were changed into dry fields where fodder-crops were begun to grow. This was an adaptation within the substance of farm-management to decrease the quantity of concentrates which had to be bought for the cows to be milked. Even though the farms, having given up horses for cattle, further for milch cows, no great change took place in cultivation of the agricultural management, because the arable land to manage was not large enough, and the cattle were kept not for labour but for stable-manure. In this area, too, the managing fields were small, so that growing fodder-crops did not develop much.⁽³⁹⁾ In the respect of arable land, however, the area had a larger one than that in the previous section and the stable-manure could be made better use of. Nevertheless, the author can not find the essential physical environment to make possible the milch cow keeping whose purpose is to produce milk in this area either.

g) *The Late Period of the Fourth Stage* When the Pacific War broke out, horses were pressed into military service; mulberry fields were forced to change into the ones on which to grow cereals. After it was over, no demand for the horses for military service, the absolute shortage of staple food-stuffs

(37) Author's 10th Report pp. 8-9.

(38) Author's 12-1st Report pp. 89-93.

(39) Author's 10th Report pp. 94-98.

owing to the diminution of the territory, and the excessive decrease in the foreign demand for silk—all the facts above exercised a great influence upon the agriculture of Japan. Firstly, the speed of changing from horse keeping to cattle keeping was accelerated because the important maintenance for horse keeping was destroyed; especially, there arose a desperate feeling toward the Japanese agriculture whose chief object is to produce the staple cereals as rice and wheat, and a vague longing after dairy farming in the European style; and lastly an increase of reclaimed land without having any dry fields. Consequently a great deal of milch cow keeping appeared throughout the Tókhō Districts—dairy farming combined with paddy culture and with dry-field agriculture and mountain-dairy-farming, etc. And accompanied with this, a large number of milk-manufacturing factories were established.⁽⁴⁰⁾ This was a general tendency observed throughout the country, but was specially conspicuous in Tōhoku. That is to say, this phenomenon reflected the physical environment of the Tōhoku Districts where there is unstability of harvest.

As a great many factories were built rapidly, the transaction of gathered milk was done quite smoothly. Though they were put at a disadvantage, because of gathering milk from their dispersed milch-cow-keeping farm in broad area, they could have been run in a state of stability, supported by the high price of milk-products caused by great demand in the whole country. Their plan in response to that was to increase the milch cows in their neighbourhood, and to divide milk-gathering spheres by establishing branch-factories.⁽⁴¹⁾ On the other hand the farmers kept on dairying with ease by mere additional labour of milking and gathering grasses and the purchase of concentrates without changing their system or agricultural management. It was because the price of raw milk was high, urged by the high price of milk-products. The dairy farming of this sort was evidently a mere addition to the farm-management that had been done. Then, was it not quite different from what was intended at the time when milch cow keeping was begun?

The rapid progression of the milch cow keeping in this manner made the price of calves of milch cows rise excessively, and then the price automatically hindered the speed of its progression in return. The phenomenon that milch cow keeping soaked into every class in every area⁽⁴²⁾ is at a glance regarded as one suited to the physical environment of Tōhoku. However, the form of keeping in this manner was completely detached from the tillage,

(40) Author's 10th Report, pp. 5-6.

(41) Author's 7th Report pp. 10-16.

(42) Author's 10th Report pp. 1-5.

that is, the traditional way of agricultural management, nothing in it was seen but the intensiveness in the phase of the economy of farm-households. The meaning of this form of the keeping was exactly the same as that of the city-milk distributors around the cities. And accordingly it can be defined as a milch cow keeping in no relation to its physical environment.

h) The Fifth Stage The milch cow keeping, which expanded and penetrated indiscriminately without taking into account the type of agricultural management and the difference in physical environment of every region, naturally requires higher cost in breeding milch cows and producing milk as well. However, so far as the demand for city-milk and milk-products was great and dairy-boom continued, and both milch cows and milk were dealt with at high price, with the result that milch cow keeping developed on a stability in appearance. But these facts brought about a considerable change, influenced by the economic-inflation which took place since 1953 the demand for milk-products was stagnant and moreover, the low price of imported ones pressed the prices of home-made products, in spite of the policy of protection.

In order to lower down the price of milk-products, those who produced milk-products tried firstly to change their gathering areas from the division of theirs to the concentrative production by a huge factory instead, and by doing so to let fall the cost in the process of production. This was put into practice in Nagano Prefecture,⁽⁴³⁾ but is not done in Tôhoku.⁽⁴⁴⁾ The other way strongly forced to the farms keeping milch cows as the form of beating down the price of raw milk. In consequence, the farms keeping milch cows were thrown into distress in every area. This was because the farmers carried on their milch cow keeping quite the same way as those of city-milk distributors, that is, the milch cow keeping was done without adopting any adjustment within the tillage section of their agricultural management in response to the keeping;—that was done by depending entirely upon milking by their surplus labour, grass-gathering by their more intensified labour and upon purchasing most of concentrates. Then the present problem for them to solve was how they should produce milk at lower cost.

At present, the custom of under-estimating the self and family-labour of farming-households has gradually been weak, consequently, "How should they

(43) Matsumoto Factory (Morinaga Co.) and Ueda Factory (Meiji Co.) are the largest two in Japan. Its enlargement had done in 1954.

(44) This fact does not suggest the backwardness of the Tôhoku districts but the producer's good prospect of the increase in the density of milch cow keeping from the viewpoint the physical environment. Indeed, Kaminoyama Fac. (Meiji Co.) has a plan of enlargement and Morioka Fac. (Morinaga Co.) has not such a tangible plan, but its grand plan is to fit for it.

transform the traditional type of the tillage-agriculture which lay too strong stress upon staple cereals?" or "How should they enlarge their managing scale without touching the section of tillage in their agricultural management?" these are thought to be a clue to solve the problem.

The former, that is, the way of adding fodder crops, is not oppressed by physical environment, but is a struggle against a historical or traditional social environment which is partial to cultivate staple cereals. And in the struggle it can not be thought to overcome the environment. This can be clearly understood through the comparison between the agricultural management seen in every place reclaimed in the later period of the 3rd Stage and in the 4th Stage, and between the reclaimed lands by the natives or by the Tôhoku men and those by the returners from abroad or non-farmers.⁽⁴⁵⁾

To conclude this, in the reclaimed lands in earlier stages the traditional way of agriculture is carried on with some exceptions, so the landscapes of the lands show no different type compared with the surrounding old-farm-lands. And that of the natives or the men living in Tohoku show the similar landscape, who are also so conservative. On the contrary, only those who have lived under a social environment of another kind, have adopted an agriculture including fodder-crop cultivation in it. Consequently, only in such reclaimed lands, milch cow keeping can be observed to be stable, and so far as it is accompanied with milch cow keeping, such a management can be regarded as well matched to the physical environment of the area.

The way of treating with the problem by enlarging the management-scale without giving any change to the section of tillage is not repelled by historic-traditional environment. However, it is impossible in every area to reclaim a new piece of field to grow fodder crops, or to expand or improve grassland. Such enterprises are not restricted strongly by physical environment. When they expand or improve their grassland,—there were few cases where grasslands were given up by land-owners in the Agricultural Reform—it is restricted, indeed, by social environment, but the restriction is regarded as a kind of class-struggle from another point of view. On the contrary, the traditional social environment whose repulse is observed in the case of adding fodder-crops to their farm-management, is thought to be a problem within the minds of farmers themselves. These restrictions are very different from each other in this respect.

In the end, after continuing such struggle for a long time, an areal differentiation takes place according to horse keeping, cattle keeping and milch cow keeping, which will adopt their respective system and modes of

(45) Author's 12-2nd Report p. 120 and 8th Report 70-74

management in accordance with stock kept through physical and social environments. However, in the case of milch cow keeping, especially the keeping after the War II, its development was brought about rapidly and it was adopted without regards to these environments. At any rate, the present Stage is a stagnant and confused one of milch cow keeping which did not take root in both physical and historic-social environments and is now regarded as a stage of selection which these two environments will make from the ways of milch cow keeping begun indiscriminately.

4 A Prospect of the Following Development (the Sixth Stage)

i) *The milch-cow-keeping region of the northeastern part of the Kitakami Mountainland* At present, the area has no favourable basis on the physical environment of milch cow keeping. The chief reason was that it did not give any suitable change to the section of tillage of the agricultural management. However, the change was next to be possible. Because there was no room for it to expand the arable land any more from the viewpoint of topography, the change was no more possible than put an end to the production of food-stuff. In Iwaizumi, there are some milch-cow-keeping farmers which send the stable-manure to the farmers in the reclaimed lands quite a long way off, and barter their fodder, instead of purchasing concentrates.⁽⁴⁶⁾ However, this is of course a special case and can not be expected in all the milch-cow-keeping farms. And it will not be so long before they are destined to disappear as stock keeping advances in the reclaimed land, too.

The measures for them to take is to consider positively how to make use of the flat surfaces which once provided a good physical condition for cattle-breeding through the combination of summer-pasture-grazing with winter-stable-keeping. A good example can be found in the transhumance of the Alps. As it does on that area, the cows are pastured on the tops in the summer time, milked on the spot where a simple installment of creamery is brought up and sent down to a factory as cream. This is one way to think of in this area. The other way is to improve completely the growth of the grass in the pastures and grasslands. The structure of the stables has been as it was since the period when the cattle of Japanese breed were kept, and no consideration is given to the device to divide urine and dung in the stables. Manured with the urine got by improving the stables, and further planted with the seed of pasturage, the pastures and grasslands will be excellent in

(46) This is one special case. And another one is that a bean-curd maker keep milch cows owing to use the residuum of the bean-curd production. Although he does not purchase concentrates. But his farm is too small to use his stable-manure. So this keeping form is also an unstable ones.

the growth of grasses. But now, it seems that they have not been manured before and especially the pastures of the mountain tops are like lawn. Consequently, they are sure to have very little grazing capacity. If these pastures and grasslands can be improved in the growth of grasses, the grazing capacity of pastures in summer will be heightened and the grasslands provide a great deal of excellent hay for winter forage. Then this area will have a physical environment favourable for milch cow keeping. That is, the improvement of the agricultural technique and the change of the method of agricultural management will revive the favourableness of the physical environments.

ii) *In the case of the milch cow keeping in reclaimed lands* There are two kinds of reclaimed lands—older and younger. The older ones were reclaimed in the later period of the 3rd Stage or in the early period of the 4th, and the younger ones in the later period of the 4th Stage, the former being less, while the latter more in number. Most of them do not include paddy fields in their farms, at present. Most of the settlers, however, have cherished a strong desire to change their dry fields into paddy fields, if possible, by constructing irrigation canals, though they realize that paddy farming is unstable and less in productivity—even if they can satisfy their desire. This idea is the very social environment, historical and traditional, which has made the tillage-farming lay stress upon the production of staple cereals.

The younger ones were reclaimed during the time when the slogan, “To dairying from crop-farming” was cried and some of them kept milch cows at the beginning of reclamation. However, the policy of leading the settlers to self-suffice as its first purpose, prevented them from adopting the system of agricultural management including milch cow keeping. Some of them sold their cows and abandoned dairy farming of their own accord, because the price of milch cows rose up.⁽⁴⁷⁾

In Showa Settlement, an older one, both milch cow keeping and horse keeping are carried on and the land utilization also shows something like that of dairy farming in foreign dairy regions. But seventy per cent of the yield of provender crops are usually sent to market of Hokkaidô as the seed.⁽⁴⁸⁾ Consequently, a great unbalance is shown between the great proportion of fodder-crop area in its land utilization and the small-scale management of its milch cow keeping. In some reclaimed lands in the northeastern part of the Kitakami Mountain only a very simple land-utilization can be observed and very few livestock are kept.⁽⁴⁹⁾ As the latter are more unfavourable in climate than the former, so it is thought to be quite proper for the latter

(47) A reclaimed land in the vicinity of Tateoka in Yamagata Prefecture.

(48) Author's 8th Report: pp. 71-73.

(49) Author's 12-2nd Report pp. 118-120.

to adopt the management stressing stock keeping. The fact is, however, that the latter show the traditional type of land utilization just as the adjoining old villages do, the managing fields being only larger than that of the old farms near by.

These facts are convincing proofs that show how strong is the traditional knowledge of the system of agricultural management, that is, a historical-traditional social-environment, which the settlers have brought with them.

There is a farm managed in Denmark-style in the Shinjo Basin, revealing the typical form of dairy management.⁽⁵⁰⁾ A great many visitors came one after another to inspect it, only to admire at its excellent management. However, the complete purchase of their food-stuff, its too high living standard and its fine stables make them feel something far beyond their lives, and be at a loss what and from where to adopt. In this respect, a quite obvious difference can be discerned between the two social environments on which basis the agricultures of Denmark and Japan stand.

It means a transgression into a different kind of social environment that dairy farming succeed completely in the reclaimed land having only dry-field. And this is, ofcourse, not an easy task. Perhaps, the success must be expected several stages ahead. Some successful examples may be cited.⁽⁵¹⁾ They can be found in some reclaimed lands where the returners from abroad settled. The settlers lost their historical traditional environment and have worn another one by living abroad for a long period, so that they are thought to have observed well the physical environment without being troubled with other agricultural method. However, there are some who was reminded of by the old social-environment, which they had forgotten, at the sight of the traditional management carried on in the neighbouring villages.

Those who were engaged in other employment than agriculture, that is, those who experienced no historical traditional social environment in the agricultural society—when such people became settlers, it is the same as those mentioned above. And in this case appears the form of the abandonment of their reclaimed lands.⁽⁵²⁾

The problem of the fund of reclamation must be taken into consideration. The agricultural management laying stress upon stock keeping was unsuccessful in the old reclaimed lands, even though the fund was comparatively much at that time when they were reclaimed. Considering this, what influences most, must be the historical-traditional environment.

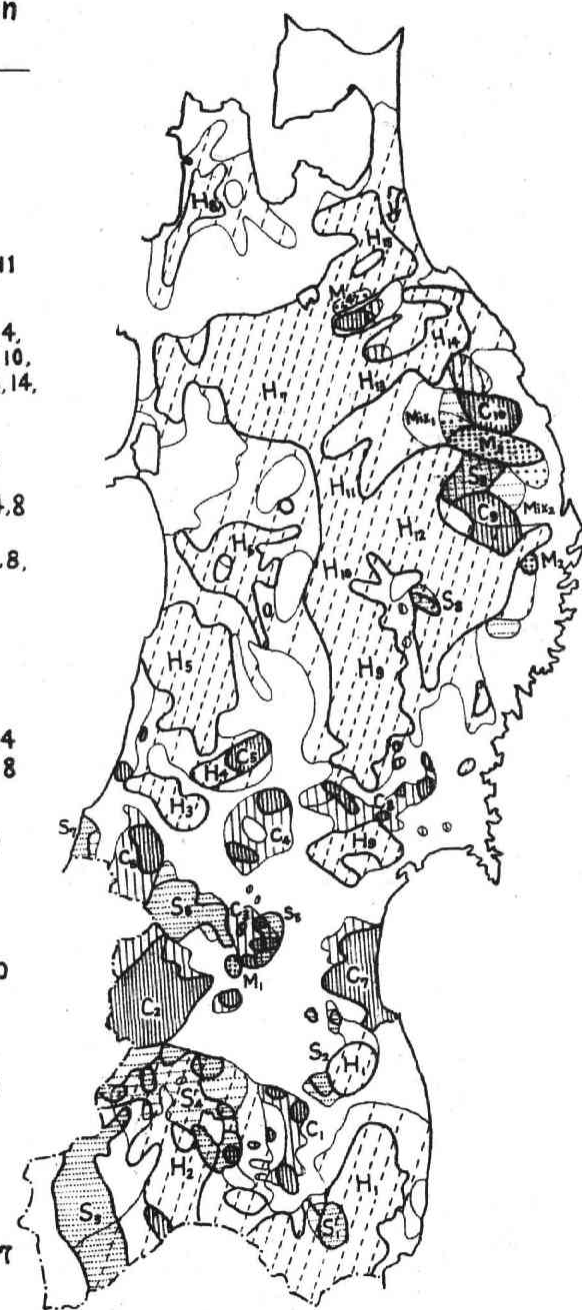
(50) Author's 8th Report: p. 71 and pp. 74-75

(51) A good example is shown in San-nokai Settlement, Iwate Pref.

(52) An extreme case is shown in Tateishi settlement, Tanohata, Iwate Pref. This reclaimed land was managed by ten farms in 1948, but in the late of 1952 no farms were found. And in 1953 by four farms were reclaimed again this area.

Division of Stages in Livestock Keeping

1st Stage	2nd Stage	3rd Stage first latter	4th Stage first latter	5th Stage first latter	Areal Division
			Milch Cow <i>milk production</i>		M _{1,4}
			around a year: <i>stable-keeping</i>		
			Cattle <i>breeding</i>		C _{2,6,11}
			summer: <i>pasture-grazing</i> winter: <i>stable-keeping</i>		
Horse <i>breeding</i> around a year: <i>pasture-grazing</i>	mountain land <i>breeding & raising</i> summer: <i>pasture-grazing</i> winter: <i>stable-keeping</i> in a part around a year: <i>pasture-grazing</i>		Sheep <i>wool production</i>	around a year: <i>stable-keeping</i>	H _{1,3,4,5,7,10,11,12,13,14,15} in part in H ₁₂
	paddy-field area <i>labouring & raising</i> summer: <i>pasture-grazing</i> in mountain land winter: <i>stable-keeping</i> in paddy-field area in a part around a year: <i>stable-keeping</i>		Sheep <i>wool production</i>	around a year: <i>stable-keeping</i>	
			Cattle <i>labouring & fattening</i>	around a year: <i>stable-keeping</i>	S _{1,2,4,8}
			in greater part around a year: <i>stable-keeping</i>		
			Sheep <i>wool production</i>	around a year: <i>stable-keeping</i>	H _{2,6,8,9}
			around a year: <i>stable-keeping</i>		
			Labour & Beef Cattle Japanese breed <i>breeding</i>	around a year: <i>stable-keeping</i>	C _{1,3,4,5,7,8}
			Short-horn breed s: <i>pasture-grazing</i> u: <i>stable-keeping</i>		
			Labour & Beef Cattle Short-horn breed <i>breeding</i>	around a year: <i>stable-keeping</i>	S _{5,9}
			s: <i>pasture-grazing</i> u: <i>stable-keeping</i>		
No Livestock			Milch Cow Herstein breed <i>milk production</i>	around a year: <i>stable-keeping</i>	C _{9,10}
			around a year: <i>stable-keeping</i>		
			Sheep <i>wool production</i>	around a year: <i>stable-keeping</i>	M _{2,3}
			around a year: <i>stable-keeping</i>		
			Sheep <i>wool production</i>	around a year: <i>stable-keeping</i>	S _{3,6,7}
			around a year: <i>stable-keeping</i>		



Most of reclaimed lands are, in general, scanty in grasslands or even if they have more, they are of inferior quality. But by improving the grasslands the milch cow keeping including grazing in it will be possible. As such lands can generally be found in abundance around reclaimed lands, there can be no struggle against traditional social-environment, so far as they adopt this system.

In the end, the development of the milch cow keeping in reclaimed lands depend entirely upon whether or not they introduce the method of agricultural management in accordance with the keeping and suitable for the physical environment.

iii) The milch cow keeping in paddy-field area Milch cow keeping is carried on in the monocultural paddy area and it is called "Paddy-field dairying". The object of milch cow keeping of this kind is to fertilize the soil and to improve the management of paddy farming which has already been brought to the limit of development in various senses. That is, by the agrarians of progressive spirit who have realized that the traditional agriculture based on the historical social-environment has been driven to its extremity, the measures have been taken, so that it is quite different in circumstances from the common way of milch cow keeping, in which most of its concentrates is purchased. The way of management is changing a part of the paddy fields into dry fields and the rotation of cropping between both. It is adopted by some with somewhat successful results,⁽⁵³⁾ but has not been so popular that it is pointed out as areal characteristics.

However, the yield of rice per *tan* rise excessively in this combination management,⁽⁵⁴⁾ it is quite evident that this is a rather powerful charm to Japanese agrarians who have fundamentally laid stress upon rice growing. Probably when dairy farming is adopted by the farm managing comparatively large paddy fields, it will be repelled less by the social environment than in the case when the farm having no paddy fields adopt it. Then it may develop more rapidly than expected. Physical environment exercises only a very weak influence in this case, on its positive side and negative one. And this seems to depend entirely upon an agricultural technique.

iv) The milch cow keeping in the other areas To what degree in area will the arable land be used for growing fodder crops? and will feed crops be able to be adopted in management? The development of keeping will probably depend wholly upon the combination of above two problems.

(53) The rotation of paddy-culture is both double cropping of ensilage (green food) and changing to dry fields for fodder crops from a part of paddy fields.

(54) S. Kikuchi: Livestock industry in the paddy-field region of the upper Kitakami Valley. NE Jap. Res., Vol. I No. 5 (1951), pp. 42-46. The yield of rice is increased 60% to 80% which is cultivated after four years cropping of fodder crops.

The prospect of next development has been considered concerning various cases as above. In short, in the areas where the section of tillage farming in agricultural management will be change so as to adopt milch cow keeping, it will develop, and also will develop in the areas where, even though the tillage section is not change, a way will be discovered of making use of the physical environment if possible.

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Part II

Relation between Physical Potentials and Social Environment about the Colonization to some Uninhabited Virgin Lands

I Social Environment of Japanese Farmers

Many areas have been under a new reclamation plan in Japan since the end of the Pacific War. After the time of the agricultural panic begun in 1929, several reclaimed lands were born as the counter plan for the surplus rural population.⁽⁵⁵⁾ Both reclaimed lands are situated on the surfaces of fans, high terraces, pianos or piedmont plains. These surfaces had been left as wilds or copses in spite of their even surfaces for the reason why the irrigation water was not introduced easily. That is, these conditions show the impossibility or difficulty in changing them into paddy fields.

The reclamation plans in the historical age had been intended for rice fields. There are many records of the constructions of long irrigation canals for the purpose of reclamation.⁽⁵⁶⁾ And also the "Shin-den" (means new-paddy field) settlements in low-swampy areas were built in the reclamation in the Tokugawa Era.⁽⁵⁷⁾ For instance, the drainage work of "Shinai-numa" lake and that of other lakes in the "Date" Province had the object of the increase of rice-field.⁽⁵⁸⁾ In the feudal age, rice was money, so the increase of rice yield was synonymous with the increase of wealth. The drainage work of Shinai-numa was not done owing to lack of food on the side of the farmers in the surrounding land or in the province, but was started from the policy of the increase of rice field. This is easily known from the fact that the settlers in the Shinai-numa land were not the neighbouring farmers, but those from remote areas.

Like this, the important policies pointed to the increase of rice field and rice was one of the crops of higher value and has the most stable price as commercial ones. Accordingly, it is a matter of course that the farmers pursued the production of rice. Such social conditions continued for a long time. Consequently the author thinks that the pursuance of rice crop infiltrated Japanese farmers so deeply as to become their second nature. It is a funda-

(55) For instance, Sowa settlement (author's 8th Report. p 69.) and the reclaimed lands in Tanohata

(56) Many examples are shown in the literature—Toshio Kitamura: Historical study of customs of irrigation water in Japan (in Japanese) 1952.

(57) Masataro Nagai: A Study of the newly developments in the Shonai plains, Bull. Yamagata Univ. Vol. 3 No. 2 pp. 89-122.

(58) Kaneo Kumagai: A study of reclamation work of "Sinai-numa" marsh in Miyagi Prefecture. Ann. Tohoku Geogr. Ass. Vol. 2 (1949) pp. 70-75.

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mental physical condition that rice crop is the most suitable to cultivate in the monsoon climate. But from such physical conditions are not immediately grown the social conditions and its influences above mentioned. Nevertheless the farmers, who have lived in such social environments that rice is necessary and that the cultivation of paddy is obliged, can not occupy the land where rice cultivation is impossible by reason of physical environment. So that such a social environment is an important reason for which the un-reclaimed lands are reserved for a long time as the impossible areas of rice-cultivation.

However, the new reclaimed lands said in the first paragraph were scarcely possible to be cultivated into rice fields owing to the poor technique at that time. So the settlers made dry-field agriculture, battling against the secondary nature within their minds. But they had so deeply rooted attachment to rice crop that they cultivated a large amount of dry-land rice.

Even now the policy of the increase of rice field is continued, accordingly gigantic dams have been constructed and the land reclamations by drainage have been excuted, so the irrigation water has been able to be introduced into several dry lands from those dams. Then the farmers change their dry field into paddy field with great delight.⁽⁵⁹⁾ Even though the land always suffered from the cold-weather damage, or they will fear the lack of their dry field crops because the second crops of paddy field are not yielded owing to cold weather, the Japanese farmers usually want to increase their rice field as possible as physical environment permits. The result of the influences of these deep-seated social environments is one of the sources that both the improvements of rice-variety and agricultural technique progress, and the paddy-field cultivation was advanced in Hokkaidô which had lain outward the northern limit of its cultivation.

These phenomena are the clear expression of the rice-pursuit social-environments that surround not only farmers as producers but also other Japanese as consumers, though any other crop has not so stable a price as that of rice and so higher labour-productivity as that of rice crop under the present social conditions in Japan.

Now, many Japanese emigrated to foreign countries owing to the lack of their cultivated lands since the Meji Era. And the emigrants ventured the rice-field cultivation in Manchuria, North and South America, where the cultivation had not existed. These facts show the width of the potentials of physical environment, but rather, the author thinks, show the strong effects of the social environments intrenched into the minds of Japanese farmers. In other words, rice cultivation is rather due to their strenuous efforts than adjust-

(59) Showa settlement and its surrounding settlements, Sannokai settlement where situated on the southwest of Morioka, and other many settlement.

ment to the physical environment.

It is very difficult to introduce milch cows, which represent an entirely different kind of social environments, into Japan that has such strong social environments. It is natural to involve great difficulties because the paddy rice farming and the dairy farming belong to two clearly different types of farming. However, in Japan milch cows have begun to be kept by the farmers in the dry-field areas similar in physical environment to the dairy regions of Europe and North America. But a typical development of dairy farming was not observed even in such an area.⁽⁶⁰⁾ Then, even in Hokkaidô where the physical environments there resemble those of the dairy regions, dairy farming has developed a little as the type of small-scale subsistent agriculture with milch cow keeping added, though the keeping began early and was supported politically and financially.⁽⁶¹⁾ Moreover, the author already described the M₃ milch-cow-keeping region, which was early formed from the feudal relations among the farmers but does not show the tendency transforming into a typical dairy farming.⁽⁶²⁾ On the contrary, the "Denmark Farm" lies at Shinjo City and is managed by a Dane as similarly as the dairy farm in his mother land.⁽⁶³⁾ And any inconvenience is not discovered in the physical environment of that area. Since the end of the Pacific War milch cow keeping is remarkably increased in Japan, especially in the Tohoku Districts. But it is only an outbreak of many abnormal dairy farms that are supported by purchasing most of the concentrates and has cultivated only few forage crops.

These phenomena that the typical dairy farming does not progress in Japan are the result of the powerful influence of social environments of rice-field pursuit even though there are no inconveniences from the view-point of physical conditions.

2 Physical and Social Environment in the Case of Colonization to Virgin Land

In this part the author, taking examples of dairy farming, will discuss on the physical environments and social environments in the case of colonization of civilized people to uninhabited lands or the land inhabited by few persons of the lower stage of civilization. The author's purpose of taking up these lands is as follows: No inhabitants or few inhabitants have none of social environments or have feeble ones. So the settlers are not influenced by the other environments. Consequently the physical environments namely "Virgin

(60) Author's 9th Report & 12th Report.

(61) Author's 11th Report.

(62) Author's 11th Report & 12-2nd Report.

(63) Author's 10th Report and 12-2nd Report

Land" are able to be utilized by them at will, and they create their new social environment harmonized between the physical environment and their ancestral social environment.

The colonization to Hokkaidô is one of these cases. In the region Ainu were then in the hunting stage and not advanced to the agricultural ones. Japanese had come only into the Oshima peninsula in the early era of Meiji, so almost any agricultural analysis of the physical environments are not done. Accordingly the region had only the un-analyzed physical environment nor any social environment except the feeble ones of Ainu. Since the Meiji Era the government has advanced its agricultural exploitation with dairy farming or mixed farming for a guide, which are managed near the limiting part of cultivation in Europe and America, viewed from the general survey of its region. Then, many settlers were introduced according to the policy. But the settlers were the people who lived in the abovementioned social environment and were subjected to the deeply-rooted influence of such environments. Accordingly the object of the farm-management was not attained and the type intended was distorted into Japanese style. This abnormal type is a kind of harmony from another point of view.⁽⁶⁵⁾

In the primary stage of the colonization to Australia⁽⁶⁶⁾ the agricultural land-utilization was a succession of try and error, because its physical environments were not surveyed. Namely, the try and error was the important experimental surveys of the potentials of its physical environments by English farmers immigrated from England. The agricultural system of England from eighteenth century to nineteenth century was the combination of wheat cultivation and sheep pasturage. The settlers were the farmers who come owing to surplus population, but whose level of their lives had been rising because the pastures rapidly developed at that time and so the enlargement of the management scale of the farms followed. Consequently the experiments were only a diagnosis through such social environments. That is, the author interpretes, the present land-utilization is only one face of the physical potentials in Australia. It will be fully understood from the following phenomena: The exploitation of the tropical land has been put off, and in the first step of settlers in 1788 wheat and sheep were brought, and the new-born rice cultivation has recently been done in the Muranbiggee-irrigation-area in the eastern part of the Murray Basin under the dry and warm climate, but rice is suited in nature to the wet and hot climate as in the monsoonia. In other words the present land-utilization is developmentally traced in the land use of England adding the experiences of the American agriculture.

(64) Author's 8th Report.

(65) Author's 11th Report.

(66) S. M. Wadham & G. L. Wood: Land utilisation of Australia, Melbourne 1939.

In the case of the colonization in the continent of North America the conditions and the development process are almost similar in Australia. It is clearly and simply shown in the process of the formation of the Dairy Region. That is, "The early settlers of American East Coast introduced dairy cattle of European origin to the colonies."⁽⁶⁷⁾ These settlers are English, Dutch and Germans.⁽⁶⁸⁾ These persons were clothed in the European-dairy-farming as it was. And they have developed the fore-social-environment as it stands without trial and failure from the reason that the physical conditions remarkably resemble that of the fore inhabited lands by chance. However, at present the circumstances are different a little. "Practically all components of the American population (except Jewish, Oriental, and Negro) are represented. 'Conditioning' to dairying is undoubtedly of more importance than ancestry at present..... Most of the present farmers of the region have been brought up to it as past of their life pattern, and accept an industry started by their forebears in response to environmental factors they themselves understood, or had explained to them by the various agricultural Experimental Stations, nearly all of which promoted the industry in their regional environment."⁽⁶⁹⁾ And yet, it is said that the influences of their own social environments having infiltrated the exceptional races—Jewish, Oriental (including Japanese, of course), and Negro—are so great that they have not begun to manage dairy farming.

The author adjudicates that the influences of the foreborne social environment are unexpectedly great and are clearly shown on the base of the wide potentiality of the new physical environment; of course, the influences are fostered by the relation of the physical environment of the land of the ancestral residence. If a leap in argument is allowed, and paradoxically speaking, the landscape of a "Virgin Land" will be differently represented by the different settlers even in the same physical environment.

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(68) *ibid* (67) : p. 264, "English settlers in New England made cheese from recipes brought from their homeland; Dutch settlers of New York and German settlers in Penn's colony of Pennsylvania produced varieties of cheese with which they had been familiar at home.... The colonies developed a specialization in agriculture rather early."

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