



Hello everyone. My name is Ai Ohara and I work as a research associate at the Laboratory of Animal Welfare (sponsored by Ishii Corp.) at the Graduate School of Agricultural Science of Tohoku University. Today, I will introduce the enriched broiler

rearing system. My talk title refers to "the Possibility of Animal Welfare husbandry for homebred breeds Tatsuno and the future".

[Slide 1] Firstly I do not suppose that most of you are familiar with poultry husbandry, so I'd like to start by talking about the background to how chicken meat is produced in this country. Self-sufficiency in chicken meat production is about 70% in Japan, which is higher than either beef or pork production. The chickens produced for chicken meat are called 'commercial chickens' (CM)'. In order to produce commercial chickens it is necessary to selectively breed the parents stock (PS), grandparents stock (GP), great grandparents stock (GGP) and a pure line for 4 generations. There are only three companies have pure lines for breeding chicken in the world, so it is an oligopoly market. Japan continuously imports chicken strains from Europe and America to cover 99% of its needs for chickens. The subsequent generations are raised in Japan with hatching and production performed domestically. So the self-sufficiency for chicken meat is about 70%, but for the genetic resources that are vital to chicken production, the current situation is that Japan is almost totally dependent on overseas suppliers. The problem with this is that when outbreaks of bird flu occur, it becomes impossible to import chickens breeds.

[Slide 2] This slide shows a page from the website of the Animal Quarantine Service. Recently, import poultries and their products were banned from France. Later this

ban was partially lifted. However, even before GGP imports were stopped, chicken meat production was unable to keep pace with demand, and so chicken meat was urgently imported. As these facts show us, the Japanese chicken meat supply is not stable. Moreover, Improvements in breeding chickens made in the West have resulted in birds that produce a lot of breast meat, which is popular in Western countries. By contrast, the Japanese favor leg meat, which tends to have a rich and meaty taste. There are some differences in preference between Western countries and Japan. Hence Japanese chicken breeds have been developed to suit Japanese tastes.

[Slide 3] "Japanese chicken breeds" have been developed in Japan from pure lines. The National Livestock Breeding Center has kept its own pure line varieties, manages and breeds them, and carries out the entire commercial chicken production process in Japan. The biggest feature of this is that it ensures traceability so that it is possible to find out where and how specific meat chickens were kept and who the parent birds were. The chickens bred in this away are Tatsuno commercial chickens, and the parent stock is Red Cornish and White Plymouth Rock chickens. Tatsuno can answer the preferences of domestic consumer's demand and cope well with the Japanese climate and market needs. They also improve the self-sufficiency rate of domestic breeding chickens, which makes them a risk hedge for chicken meat production. For these reasons, Tatsuno is considered to contribute towards ensuring a stable supply of safe and secure chicken meat.

Now, let's make a comparison of the differences between Japanese chicken breeds, Western chicken breeds and "jidori" (locally produced chickens).

[Slide 4] Firstly, with regard to their respective shares of the chicken meat market, approximately 84% of the Japanese market consists of broilers based on Western chicken breeds, 1~2% are from Japanese chicken breeds or jidori, etc., and about 15% are egg-laying hens and their parent chickens. Also, hens that no longer produce eggs are usually turned into chicken meat eventually. In supermarkets, this meat is sold as “oya tori” or parent chicken, while the meat of commercial chicken is sold as “wakatori” or young chicken. In the case of broilers, the per-day increase in weight is known as the daily gain. When we compare the daily gain between the three breeds of chickens we find that for Western chicken breeds the average daily gain is approx. 58g, growing up to 2.5 ~ 3kg in approx. 50 days before then being dispatched to market. Their productivity is quite high which contributes to the low price of chicken meat. Tatsuno Japanese chicken breeds are bred from two kinds of parent stock, as I mentioned before. Their daily gain is approx. 44g and they are kept for around 60 days before handling. The productivity of Tatsuno birds is lower than that of Western chicken breeds but their production is focused more on meat quality. Moreover, in jidori keeping, there is a strict rule that such birds must have a bloodline consisting of over 50% native Japanese breeds. A native breed is defined as “a breed formed in Japan before the Meiji era, or having been introduced to Japan before the Meiji era and that has taken root in the country.” Examples include ‘Hinai-dori’ and ‘O-Shamo’. These breeds are generally classified as natural treasures and we are not permitted to eat them. Chickens produced by mating Hinai with Rhode Island varieties are known as Hinai jidori. Since their daily gain is only around 25g, their feeding period is quite long. A great deal of time and care must be devoted to making delicious chicken, so the price of their meat is high.

The daily gain is a major feature of each breed and a key point within the production system. It is also said that there is a deep relationship between the daily gain and the birds’ level of welfare. When the daily gain is large, it means that the growth speed of muscle (meat) is fast. But generally the growth speed of their bone and cardiopulmonary system is not as fast as muscle. So

their bones cannot support the body size and weight and the birds tend to develop lameness, a symptom of which is limping with every step. This may become a factor in the development of ascites, a condition in which fluid accumulates in the peritoneal cavity. Moreover, when their weight increases rapidly, the birds may not be able to move, so they sit all the time and sometimes develop dermatitis on their breasts or footpad. These situations influence the welfare and productivity of chicken.

[Slide 5] Now let us find out and ask ourselves, ‘what is a problem in the welfare of chicken? What does it mean to satisfy the requirements of livestock welfare? That is, it is considered that the comfort of livestock can be maintained by satisfying the following five freedoms. Almost all broiler producers take sufficient measures to ensure the birds’ “freedom from hunger and thirst,” “freedom from discomfort” such as from overheating, etc., and “freedom from pain, disease and injury”, since all these things are directly connected to productivity. Also, “freedom from fear and suffering” can be significantly improved if supervisors treat livestock carefully. However, hardly any measures are taken at all to ensure the fifth freedom, which is “freedom to express normal behavior”.

Accordingly, I think that the first four freedoms are already considered, but the fifth freedom is not covered. Some additional care to allow birds to express more normal behavior might improve these problems. For chickens, pecking objects is one normal form of behavior. So by providing objects for chickens to peck, not only encourages them to peck but also makes them more active. Some paper reported that increasing activity helps to develop the bones and cardiopulmonary system which in turn leads to improvement in physical problems. Just as with broilers, such problems have appeared in the domestic production of Tatsuno breeding chickens. But the Tatsunos’ daily gain is less than that of Western chicken breeds, so it seems Tatsunos are suitable candidates for the chicken welfare rearing system.

[Slide 6] We carried out an environmental enrichment

experiment in which we placed things in the house that triggered normal behavior. In this context, normal behavior essentially means 'natural habits'. And in the case of chickens this means pecking things, roosting when going to sleep, etc. So we conducted a comparative experiment between an ordinary rearing group provided with only a waterer and a feeder, and an enrichment test group provided with additional hay bales and perches, [slide 7]. The experiment results however showed no significant differences in the dispatch weight of the daily gain, bird productivity, or in the number selected for dispatch or the number of dead or diseased birds.

[Slide 8] However, regarding breast inflammation, which is considered a problem, the results show a markedly lower incidence of the problem among male chicks in the test group. [Slide 9] Also, with regard to footpad inflammation, the number of chicks that did not have this problem was larger among the females in the test group. [Slide 10] As for a summary and future research plans, we will be analyzing video recordings of the birds' behavior and verifying the availability of enrichment materials. In addition, we are planning to comprehensively examine enrichment testing by calculating the ratios of pseudo eosinophils and lymphocytes, which are indicators of physiological stress.

From the results of all of these things, during the next fiscal year we are aiming to build up a Japanese-style animal welfare animal husbandry system for meat-use chickens through the use of improved enrichment materials and an objective evaluation of the breeding environment.



【Slide 1】



【Slide 2】



【Slide 3】

	ブロイラー	国産鶏種	地鶏
シェア (年間)	84% (632百万羽)	合わせて1~2% (18百万羽)	
血統	欧米鶏種	多色コーニッシュ × 白色フリマフロック	在来種由来の血統を50%以上
日増体	約58g	約44g	約25g
飼育方法	約50日	約60日	平飼いで80日以上
出荷体重	2.5~3kg	約2.7~2.8kg	平均2.74kg(約108日齢)
飼育密度	約16羽/m ²	約14羽/m ²	平飼いで28日齢以降は10羽/m ² 以下
特徴	生産性が高い 低価格を実現	生産性は普通 美味しい	生産性は低い 美味しい高価格

【Slide 4】



【Slide 5】



【Slide 9】



【Slide 6】

- ### まとめと今後の研究予定
- 生産性: 効果なし
 - ウェルフェア改善: 可能性あり
 - 行動解析= 資材の利用性検証
 - リンパ球/偽好酸球比率(生理的ストレス指標)
- ⇒エンリッチメント資材のさらなる改良
⇒温熱・空気・敷料などの飼育環境の評価
⇒改善ポイントの抽出
- 日本式養鶏アニマルウェルフェア畜産モデルの構築

【Slide 10】

結果:生産性

生産形質	オス		メス		単位
	対照群	試験群	対照群	試験群	
出荷体重	2.90	3.01	2.39	2.45	kg
日増体	49.2	50.2	39.1	39.5	g
淘汰羽数	253	357	305	171	羽
斃死羽数	259	267	207	110	羽
出荷羽数	4812	4686	4914	5152	羽

生産性に大きな差は見られなかった

【Slide 7】



【Slide 8】