

THE DAIRY INDUSTRY IN ASIA

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ABSTRACT

The dairy industry in Taiwan supplies all domestic fresh milk needs, although powdered milk and other milk products are imported. In the past forty years, dairy production has risen steadily. Holstein cattle are the major dairy breed, and average herd size is 94 head.

AGRICULTURE

Taiwan, R.O.C. is situated on the Tropic of Cancer in the Pacific Ocean, east of the Mainland China. It has a total area of 35,981 km², of which 26.4% is coastal plain, 26.9% is slopeland, and 46.7 is mountainous. The average farm size is 1.19 ha. Taiwan has an average temperature of 22.5°C, a yearly rainfall of 2,000 mm, and a total population of 21 million.

Over the past few decades, a large area of cultivated land in Taiwan has been used for industrial, commercial and housing purposes, so that the cultivated land area has become very limited. Intensive livestock production is an efficient way of utilizing a limited land area. In 1992, the livestock production value represented 32% of the total agricultural production value. The animal industry in Taiwan has become more important than ever before. Today, in addition to the promotion of production, the stabilization of supply and demand and the disposal of animal wastes are serious problems in Taiwan.

DAIRY INDUSTRY

Development of the Dairy Industry

The development of the dairy industry began in 1957, with the second four-year economic reconstruction project. To utilize surplus labor in rural areas, 20 farming families who owned parcels

of infertile slopeland in Northern Taiwan were encouraged to raise dairy cattle under a loan program sponsored by the government. Initially, each farmer raised only one or two imported Holstein dairy cows. These dairy farmers gained additional income from jobs off the farm. Later, other farmers also joined this program, and subsequently both the number of cattle and levels of milk production increased. In 1964, there were as many as 356 dairy farms that produced 11,283 mt of milk.

In 1965, the government opened the market to imported powdered milk. This had a big impact on the local dairy industry. Dairy plants found it no longer feasible to purchase fresh milk from local farmers. The dairy industry encountered its first crisis. The government issued guidelines and established the Taiwan Dairy Development Committee (TDDC) to save the dairy industry. An additional surcharge on imported dairy products was levied, and funds were allocated to the TDDC. These funds were used to reduce the price difference between local and imported milk. This policy helped the number of dairy farmers to increase to 1,290, and milk production rose to 41,879 tons.

Taiwan faced a second crisis in 1975, when frozen beef was imported. This led to a reduction of the income of dairy farmers from selling culled cattle and calves, and the cost of milk production went up. Many farmers gave up dairying. To solve this problem, the TDDC discussed with both milk plants

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and farmers an increase in the price of fresh milk. A higher guaranteed price helped the dairy industry to restore its position. In 1981, the number of dairy farmers was only 699, but milk production went up to 50,154 tons.

Since 1981, dairy farming has been practiced as a full-time occupation. Infrastructure, and the relationship between farmers and milk processing plants, also improved. In May 1981, the government passed the "Policy Measures for Raising Cattle", which gave the highest priority to dairy cattle, followed by beef cattle. The dairy industry was considered to be one of the focal development industries. In 1993, although the number of dairy farmers remained at only 1,063, the number of dairy cattle increased to 100,392 head, with an average herd size of 94 head, and total milk production went up to 278,472 tons

MAJOR DAIRY PROGRAMS

Breeding

There are no native dairy cattle breeds in Taiwan, and Holstein cattle from Australia were introduced in 1957. Breeding was conducted to improve their performance and adaptation to Taiwan's subtropical conditions. Tests of both purebreds and crossbreds were conducted. It was observed that the performance and adaptability of Holstein purebreds were better than those of the crossbreds. Thus, Holstein cattle were recognized as the sole dairy breed in Taiwan.

Dairy Herd Improvement

The dairy herd improvement (DHI) program was introduced from the United States 15 years ago. At present, a total of 14 supervisors are employed by research stations and farmers' associations. They visit DHI farms once a month to collect herd management records on cattle pedigrees, reproduction, calving, diseases, and feed. Milk yield is measured, and samples of the milk of individual cows are taken. The milk samples and record sheets are sent to a central laboratory for further analysis. The central laboratory tests the milk components, including fat content, protein, total solids, and somatic cell count (SCC). The management and milk test reports are returned to dairy farmers within seven days, to help them make management decisions and genetic evaluation.

In 1993, there were a total of 7,908 milking cows in 183 herds under the DHI program, repre-

senting 17% of Taiwan's total herds. The average DHI herd size was 43 milking cows. Their genetic improvement records are presented in six Tables (Table 1 Table 2 Table 3 Tabale 4 Table 5 Table 6).

Forage Supply

The most important types of local forage are Pangola grass, Napier grass and corn silage. In recent years, farmers have been eager to enlarge the size of their herds, but there has not been enough local forage. In 1981, the government carried out a "paddy field diversification" program, which converted rice fields to the production of other designated crops. Pasture forage crops were accepted as designated crops. In 1993, the forage area rose to 9,200 ha, supplying 70% of the forage needs of dairy farms. The rest was made up by imported alfalfa hay and Bermuda grass during the winter season. Therefore, this program simultaneously solved the problems of a shortage of forage paddy and an oversupply of rice.

Satellite Farms

To set up an efficient sales channel for milk, the government carried out a "satellite farm" project in 1986. Under this project, the government persuaded milk plants to cooperate with farmers. The volume and price of milk were decided by contract and revised annually. In addition, the plants assumed responsibility for providing farmers with extension advice.

Market Promotion of Milk

To increase milk consumption, the Milk Plants' Association was entrusted by the government to promote dairy products. In 1988 under the program, various activities such as media advertisement, supply of milk to the military, schools and orphanages, and the promotion of yogurt, were carried out. The annual growth in milk consumption is steady at 12% to 16%. In view of this growth, dairy plants are willing to purchase a great deal of milk to meet market requirements.

Major Problems and Constraints

Although the dairy industry in Taiwan has been growing and prospering over the past few years, dairy farms still face some herd management problems. The impact of liquid milk importation will become more serious when Taiwan enters GATT.

Table 1. Taiwan DHI records from 1981 to 1993

	1981	82	83	84	85	86	87	88	89	90	91	92	93
Herds enrolled	344	396	391	381	414	345	215	175	189	210	160	177	183
Total no. of cows	3250	4293	4878	4902	5546	5448	3660	3740	3920	5124	5115	6539	7908
305-2x-ME milk yield (kg)	5308	5634	5689	5437	5480	5283	5798	5862	5941	6135	6258	6364	6368
305-2x-ME milk fat yield (kg)	168	180	176	177	166	171	197	199	204	207	225	229	250
Dairy milk/cow (kg)	15.1	15.3	14.6	14.6	15.0	14.3	15.7	16.0	16.3	17.1	18.3	19.1	19.5
Av. herd size	9.4	10.7	12.5	12.9	13.4	15.8	17.2	18.4	20.4	23.2	31.9	36.9	43.2

Table 2. Monthly milk components and SCC from July 1992 to June 1993

Month	No. of Cows	Dairy milk yield	SCC (x 1000/cc)	Fat (%)	Protein (%)	Total solids (%)
1992						
July	7328	17.30 • 0.08	690.49 • 17.42	3.80 • 0.01	3.18 • 0.01	12.45 • 0.01
Aug	7460	17.09 • 0.08	761.97 • 28.71	3.73 • 0.01	3.19 • 0.01	11.96 • 0.01
Sept.	7473	17.79 • 0.08	740.49 • 18.57	3.77 • 0.01	3.19 • 0.01	12.04 • 0.02
Oct.	8088	19.01 • 0.09	723.08 • 17.83	3.71 • 0.01	3.21 • 0.01	12.14 • 0.01
Nov.	7130	20.42 • 0.01	605.21 • 14.58	3.66 • 0.01	3.20 • 0.01	12.11 • 0.01
Dec.	7920	20.81 • 0.09	543.01 • 17.05	3.62 • 0.01	3.14 • 0.00	11.86 • 0.01
1993						
Jan.	7391	21.15 • 0.09	457.66 • 16.84	3.67 • 0.01	3.20 • 0.01	12.94 • 0.01
Feb.	8322	21.01 • 0.09	484.92 • 13.11	3.60 • 0.01	3.64 • 0.01	12.73 • 0.01
Mar.	8554	20.96 • 0.09	480.70 • 18.25	3.69 • 0.01	3.70 • 0.00	12.78 • 0.01
Apr.	8597	20.75 • 0.08	512.24 • 16.82	3.61 • 0.01	3.18 • 0.02	12.09 • 0.02
May	8661	19.43 • 0.08	585.49 • 13.49	3.70 • 0.00	3.14 • 0.01	12.78 • 0.01
Jun.	7906	18.77 • 0.08	629.13 • 16.31	3.74 • 0.01	3.14 • 0.01	12.02 • 0.02
Average	7902	19.50 • 0.09	600.27 • 17.42	3.69 • 0.01	3.26 • 0.01	12.33 • 0.01

Note: Means • S.E.

Table 3. Monthly distribution of somatic cell counts in DHI herds, July 1992 to June 1993

Grade	SCC (x 1000)	Ideal value in tropics	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
0	0-18	11	3.2	3.8	4.9	6.1	8.5	5.0	5.0	5.8	5.5	5.2	3.8	3.9
1	19-35	16	6.8	7.7	6.7	9.3	10.9	9.6	9.7	9.6	9.0	9.3	8.7	8.2
2	36-71	11	14.0	13.1	10.7	12.8	13.7	13.7	14.4	14.9	14.2	15.2	14.5	13.6
3	72-141	12	16.7	15.9	14.5	15.6	16.0	16.4	16.9	17.9	17.6	16.7	16.8	16.5
4	142-283	13	18.2	17.6	17.4	17.0	15.5	16.6	18.1	17.2	17.5	16.9	17.8	17.9
	Subtotal	63	58.9	58.1	54.2	60.8	64.7	64.8	64.0	65.5	63.9	63.2	61.6	60.1
5	284-565	11	14.7	14.4	15.6	13.7	12.8	13.4	14.3	12.6	13.7	13.5	15.2	15.0
6	566-1130	10	11.2	11.2	12.7	10.2	10.2	10.2	10.0	9.8	10.5	10.7	9.8	10.1
7	1131-2262	6	7.7	8.2	9.3	7.9	6.5	6.2	5.9	6.5	6.1	6.6	6.8	7.5
8	2263-4523	5	4.5	5.2	5.5	4.8	3.8	3.8	3.9	3.7	4.0	3.9	4.4	4.6
9	4524-9999	5	3.0	2.9	2.7	2.6	2.0	1.6	1.9	1.8	1.7	2.2	2.2	2.8
	Subtotal	37	41.1	41.9	45.8	39.2	35.3	35.2	36.0	34.5	36.1	36.8	38.4	39.9

SCC: Somatic Cell Count

Table 4. Comparison of somatic cell counts and production levels on DHI farms, July 1992 to June 1993

Production level (kg/year)	No. of herds	Average Somatic Cell Counts			
		Sept. (1992)	Oct. (1992)	Mar. (1993)	July (1993)
<5500	14	778 • 94	613 • 95	560 • 109	688 • 81
5501-6000	30	763 • 82	548 • 49	528 • 53	670 • 59
6001-6500	52	749 • 43	530 • 30	483 • 67	621 • 47
6501-7000	42	718 • 55	517 • 37	464 • 36	633 • 58
7001-7500	26	750 • 72	525 • 47	428 • 38	591 • 52
>7500	15	680 • 40	511 • 27	445 • 58	578 • 77
Average	179	740 • 18	534 • 17	480 • 18	629 • 16

Table 5. Average 305-2x-ME milk yield of DHI cows per lactation, July 1992 to June 1993

Lactation	No. of cows	%	Average 305-2x-ME milk yield
1	1641	23.11	6429 • 32
2	1921	27.88	6487 • 39
3	1275	17.96	6388 • 47
4	892	12.56	6393 • 50
5	699	9.84	6270 • 60
6	402	5.66	6290 • 90
7	167	2.35	6402 • 128
>8	104	1.46	6157 • 202
2.89 (Average)	7101	100.0	6386 • 18

Table 6. The reproductive efficiency of DHI cows, July 1992 to June 1993

Days open	No. of cows	%	Services/conception	No. of cows	%
<60	563	12.24	1	991	21.54
61-90	877	19.07	2	1156	25.31
91-120	800	12.39	3	1084	23.57
121-150	586	12.35	4	682	14.83
151-180	642	13.96	5	376	8.17
181-210	595	12.93	6	171	3.72
Over 211 days	539	11.72	Over 7	140	3.04
Average 156	4600	100	Average 2.9	4600	100

Other major problems include high raw milk costs, heat stress in cattle, waste pollution, a labor shortage, mastitis, and a milk surplus in winter.

Proposed Strategies

Looking back at the history of dairy development in Taiwan, we have solved several crises and kept the business in good shape. However, the industry will have to face trade liberalization in the near future. Therefore, strategies and policies should be renewed by the government. The proposed

strategies for the dairy industry are as follows:

1. Farm management
 - Enlarging herd size to an economical scale.
 - Automation of feeding and milking.
 - Programs to reduce the cost of milk.
 - Strengthening dairy farmers' organizations.
 - Joint purchase of farming materials.
 - Integrating research projects.
 - Conducting a contract veterinarian system.
 - Increasing loans to farmers.

2. Milk marketing
 - Distinguishing the fresh and long-life milk markets.
 - Simplifying market channels.
 - Using large aseptic facilities to store surplus milk.
 - Promoting milk and yoghurt consumption
3. Administrative support
 - Amending present regulations governing the administration of the dairy industry.
 - Strengthening the fresh milk stamp program.
 - Adjusting the tariff on liquid milk
 - Adjusting the period during which importation of liquid milk is permitted.

CONCLUSION

In the long run, milk prices should be determined directly by supply and demand. The local dairy industry should concentrate on fresh milk and yogurt. To retain a steady market, the reduction of production costs and simplification of market channels are important. It is believed that this goal can be realized by the joint efforts of farmers, milk processing plants and the government.

DISCUSSION

Dr. Lustria pointed out that Taiwan has a highly developed industrial economy, and dairy production is not part of the traditional agricultural economy. He asked whether Taiwan might consider importing dairy products, rather than producing them domestically. Dr. Wang answered that this is a matter of government policy. In 1965, Taiwan's dairy industry had its first crisis because of large imports of powdered milk. The economy at this time was not very strong, and to protect the dairy industry, the government decided to impose a levy on imports. The funds raised by this levy were used to extend or promote the consumption of other dairy products such as yogurt. In 1988, Taiwan stopped imposing this tariff to comply with GATT, although there is still a ban on the importation of fresh milk. Perhaps in 1995, Taiwan will have to open its domestic market to imported fresh milk.

Dr. Zainuddin asked the somatic cell count level at which milk is rejected. Dr. Wang replied that the somatic cell count is not yet included in milk assessment. Information on somatic cell counts in milk has been collected and analyzed for the past three years, and used to educate farmers. The somatic cell count will shortly be included as an item in milk assessment, and the maximum permissible somatic cell count will be set at 500,000. Milk with a count higher than this will be rejected. Dr. Wang added that the mastitis problem in Taiwan is very serious, especially in summer. If farmers are to improve this situation, they must change their production system, and the somatic cell count is a good way of ensuring that they do.