Dairy buffalo breeding in countryside of China

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ABSTRACT: Chinese buffalo is of swamp type, mainly distributed in countryside of 18 provinces in southern China. China has the third population of buffalo in the world. There are 22.75 million buffaloes in China in 2005, representing 17.37% of all cattle in the whole country. Historically Chinese buffalo is mainly used for drought since their milk production is very low with an annual milk yield of 500-700 kg. Therefore, it is important to improve them to change into dairy buffalo through crossbreeding with exotic river type dairy buffalo breeds. Murrah and Nili-Ravi, the most famous river type dairy buffalo breeds in the world, were introduced from India and Pakistan in 1957 and 1974, respectively and used to crossbreed with indigenous Chinese buffalo for genetic improvement. The effect is very prominent that the performance of crossbred has been improved significantly after several decades and the milk yield reaches 1200-2000 kg. Recent years in countryside of China, buffalo rearing has been changed from extensive and dispersive model in the past into specialized small or medium dairy herd model for the present along with the rapid development of dairy buffalo breeding and the model of dairy buffalo breeding sub-district has been formed. This article introduces briefly that the system of dairy buffalo breeding as well as producing, processing and selling of buffalo milk under the current condition and the prospects of dairy buffalo development in countryside of China.

Key words: Countryside, Dairy buffalo, Breeding

China has a history of buffalo breeding for more than 7000 years (Wey et al. 1980), and buffaloes are mainly distributed in 18 provinces in southern China, the quantity of buffaloes in stock in 2005 was 22,745,300, ranking the third place in the world (FAO, 2005). Buffaloes have long been used for farming in our country, their producibility is relatively poor. Therefore, the exotic dairy buffaloes must be introduced in order to improve local buffaloes to dairy buffaloes. China has respectively introduced famous dairy buffaloes breeds (Murrah and Nili-Ravi) from India and Pakistan to crossbreed with local buffaloes in 1957 and 1974, after decades of research and practice, the producibility of hybrid offspring has been remarkably improved, the milkability can reach to 1200-2000kg. As the buffalo breeds are improved and development of buffaloes is reinforced, the owner and feeding forms of buffaloes change a lot. Especially in recent 2 decades, Chinese government has increased the input to buffalo resources development and definitely put forward that buffalo-milk-in-
dustry is a new economic increasing point of countryside, and development and utilization of buffaloes is an important way to regulate rural economic structure, increase farmer's income and settle the employment of overmuch work force, therefore, Chinese government has established Buffalo Research Institute and Buffalo Breeder Bull Station for buffalo research and breeder supply .

In recent years, as Chinese government paid great attention to and guided buffalo development and increased the input, dairy buffalo industry has been rapidly developed in counties, the enthusiasm of farmer to feed buffaloes ran high, and many characteristic dairy buffalo feeding forms have been emerged, which contribute a lot to the utilization of buffalo and the increasing incomes of buffalo culturists.

**Current situation of dairy buffalo industry in China**

*Effects of buffalo improvement and quantity of dairy buffaloes*

Chinese buffalo is of swamp type, they are small-size and the milk and meat performance are poor. The adult local female buffaloes weigh 250-400kg, the average milk yield in a lactation is 500-600kg, while that of the selected buffaloes can reach 800-1000kg, the contents of milk fat, lactoprotein and dry matter are 7.5%, 5% and 20%, respectively (Yang et al., 2005). It is reported that after crossbreeding of local buffaloes with dairy buffaloes (Murrah and Nili-Ravi), the milk yield of the first and second generation Murrah crossbreds respectively reached 1240.5kg and 1423.3kg, which were 13.5% and 30.2% higher than that of selected local buffaloes (P<0.01); the milk yield of the first and second generation Nili-Ravi crossbred in a lactation respectively reached 2041.2kg and 1994.9kg, which were 86.8% and 115.2% higher than that of local buffaloes (P<0.01); the milk yield of the triple crossbreds and offspring of triple crossbreds respectively reached 2294.6kg and 1994.9kg, which were 109.98% and 82.55% higher than that of local buffaloes (P<0.01). The contents of milk fat, lactoprotein and dry matter in crossbred milk are 7.9%, 4.5% and 18.4%, respectively (Zhang, 2000). According to incomplete statistics, more than 1 million crossbred buffaloes have been born in China in recent 30 years. In recent years, the quantity of hybridized female buffaloes per year is more than 0.55 million, the biggest population distributes in Guangxi and Yunnan and the quantity of buffaloes in these two provinces respectively reached 359,000 and 98,000 in 2005 (Huang and Huang 2006). According to the statistics of Cao Yongxin et al. (Cao et al., 2006), there were 30,000 milking buffaloes in China in 2004, 61.5% of them were crossbred buffaloes, while 38.5% of them were local buffaloes, the milk- production mainly centralized in Guangxi, Guangdong, Fujian, Zhejiang and Sichuan. The buffalo milk yield reaches 33341 tons (raw material milk, containing calf-nursing milk), of which 22357 tons are produced by hybrid buffaloes, accounting for 67.05% of total output; 9756.5 tons are produced by local buffaloes, accounting for 29.26% of total output; 786 tons are produced by purebred buffaloes, accounting for 2.36% of total output.

*Current situation of buffalo milk processing*

Buffaloes have been milked and the milk has been processed into dairy products for more than 100 years in China. As early as the end of 19th century, few farmers in Guangdong and Zhejiang have done local buffalo milking as a sideline, and processed milk into...
special products such as “milk cake”, “milk bean curd”, “creme” and “ginger juice milk”, which have become traditional reflection and been going on now. In the early 20th century, some merchants have been involved in milk-processing in those areas, they set up buffalo milk-processing factories to produce condensed milk, and these products have been sold to southeastern Asia, such as the “Feiyuan” condensed milk produced in Jiexi Guangdong, and “Qindiao” condensed milk produced by Baiheng factory in Wenzhou Zhejiang.

Between the late 1970s and the early 1980s, some hybrid buffalo farms have been established in main buffalo-breeding areas such as Guangxi, Guangdong and Hubei, and some small buffalo milk-processing factories subsequently appeared. From 1996 to 2002, “EU - China Buffalo Development Project” have been carried out in Guangxi, Guangdong and Yunnan; breeding of breeder buffaloes, buffalo-crossbreeding, technical training and milk-processing were promoted in selected areas; a batch of buffalo-milk-development demonstrative bases were set up in some counties and cities with right conditions, some favorable results were made, in this way, the development of buffalo-milk-industry has been pressed ahead. So far, there have been few special buffalo-milk processing factories distributing in Nanhai in Guangdong, Guangxi Buffalo Research Institute, Wuxuan and Lingshan in Guangxi. These factories are of small scale and poorly equipped, the products are of unitary variety and of no characteristics. The main varieties of buffalo-milk dairy products include pasteurized milk, yoghout, fancy milk drink and condensed milk, furthermore, there’re some characteristic products made by traditional techniques in some places such as milk-cake, milk bean curd, crème and ginger juice milk. In some areas, since dairy buffalo breeding are dispersed and for lack of milk storage equipments, some farmers directly sell fresh milk to consumers.

**Buffalo-breeding modes and experiences in rural areas in China**

*Feeding and management systems*

The buffaloes are bred by millions of peasant households in China, each farmer (household) popularly raises 1-3 buffaloes, the forms of buffalo rearing are extensive, buffaloes are grazed in field and fed on agriculture residual products in Spring and Autumn without concentrates, and buffaloes are only raised for farming.

As the intention to raise buffaloes changed from farming to milk and meat production, the forms of buffalo breeding subsequently change, some breeding subdistricts united by specialized breeding households and buffalo culturists has been formed. Each specialized household generally raises 10-100 buffaloes, while the quantity of buffaloes in a subdistrict reaches 100-300. The buffaloes are half-housed raised by family labor forces or by employees, and fed on planted pasturage and byproducts of crops and supplemented with some concentrates according to the milkability of dairy buffaloes. As the farmers’ major source of income, these buffaloes are mainly used for milking or meat-production.

In recent years, the dairy buffalo breeding has been rapidly developed in countryside in China. The rural areas established various dairy-buffalo-breeding forms in accordance with concrete realities, there are mainly three forms as follows:

“**Company + buffalo culturists association + buffalo-breeding households**”

Buffalo-breeding households set up associations under the direction of research institute and related administrative branches. As the bridge of companies and breeding households,
the associations organize households to breed dairy buffaloes and produce milk with their own resources, establish perfect service system, manage links such as production and sells, then aid the poor to reach common prosperity.

“Company + buffalo-breeding sub-district + households”

The buffalo-breeding households centralize their buffaloes to a subdistrict with the aid of company. The advantage of this form is that it can enhance the organizational level of households and resolve the contradictions between family production and social service, small-scale production and big market. This form is beneficial to introduce enlarged-scale production, standardization, nuisance-free breeding techniques and application of scientific research achievements. The form can also reduce the cost of production and increase productive efficiency.

“Planting grass in orchards- feeding buffaloes with grass- fertilizing with buffalo dung”

In the areas with high quantity of buffaloes and large acreage of orchards, by crossbreeding swamp buffaloes with river buffaloes, the improvement of breed has been accelerated to change servicing buffalos into milking ones. And all land resource available (such as orchards, hillsides, sloping lawns and low yield paddy fields) are utilized to grow forage for buffalo-breeding, these means can not only expand the channels of increasing farmers’ incomes, but also promote the development of rural economics and improvement of environment. The ecological breeding form, “Planting grass in orchards- breeding buffaloes with grass- fertilizing with buffalo dung”, realizes the optimization of resources such as glebes, forages, buffaloes and fruiters; and forms a benign chain of substances, energy and nutrition; the form helps the development of combination of ecological environment and agriculture and animal husbandry, and effectively promotes the development of buffalo dairy industry.

Reproduction and hybridizing systems

So far, the reproduction and hybridization are performed by combining nature service with artificial insemination (AI). AI is mainly adopted in the breeding subdistricts with right traffic conditions, while nature service is adopted in that with poor traffic conditions. The national buffalo breeding farms and buffalo bull stations have been set up in the main buffalo producing areas in China, and the bulls used for semen-collection are annually evaluated and nominated. The breeder bulls needed by dairy-buffalo-breeding subdistricts are directly provided by national buffalo breeding farms, while the frozen semen is directly provided by national buffalo semen stations. Buffalo Research Institute and Breed Improvement Station are responsible for the training of artificial insemination technicians and providing related technique services. So far, there’re over 2700 buffalo artificial insemination technicians, distributing in the subdistricts of various cities and counties, and their salaries are afforded by state finance.

Production and marketing systems of buffalo milk

The raising of buffaloes is mainly performed by specialized households and breeding subdistricts in the countryside and the breeding scale is small. Therefore, the majority of breeding subdistricts adopt manual milking while some subdistricts with good conditions adopt machine-milking.
As for milk purchasing, the dairies set up milk purchasing stations according to the distribution of buffalo-breeding subdistricts, and pricing buffalo milk in accordance with the quality of milk. But there are still some households directly sell milk to consumers.

**Development prospects of dairy buffalo in countryside**

China is abundant of buffalo resources. China is situated at subtropical regions and rich in forage grass, the conditions in China are very suitable for the growing of buffaloes. Murrah and Nili-Ravi, the most famous river type dairy buffalo breeds in the world, were respectively introduced from India and Pakistan to crossbreed with Chinese local buffaloes. After decades of efforts, the effect is very prominent that a large number of hybridized dairy buffaloes have been produced throughout the country.

In recent years, China has had a regard to the development of buffalo milk and increased the inputs for it each year. The enthusiasm of farmers to breed dairy buffaloes ran high, the dairy buffalo development faces a new development opportunity. We believe that in the near future, Chinese buffalo dairy industry, as an emerging industry, will develop to a pillar industry for national agriculture and rural economy and become an important means to increase the income of farmers and wipe out poverty.

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