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STUDY AND REALIZATION ON ORGANIC MILK SOURCE BASE CONSTRUCTION

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ABSTRACT Organic milk and organic milk production is a growing part of the main-stream of milk consumption and construction in developed countries where the market potential is enormous. Although the “OFDC Organic Certification Standards” have been carried out in China, organic milk production has not begun to this date. Higher quality milk is needed to meet the OFDC requirements. Based on the requirements of the “OFDC Organic Certification Standards” and years of experience in milk production facilities construction, the authors of this paper initially worked on the conception of organic milk source facilities in China. This paper studies three aspects: construction techniques, livestock facility construction and environment. Some questions and methods are mentioned that ensure the healthy and efficient development of the dairy industry. Meantime, this paper addresses the “health raising” model which can offer some feasible methods to suit the situation of China and contribute to organic milk source facility construction, to respect the sustainable development of the dairy industry and meet the high quality standards of organic milk production.

Key Words: organic milk, organic milk source base, cattle house construction, manure handling system

INTRODUCTION

The quality and security of milk and milk production directly influence health and living quality of customers. With the increase of people’s environmental protection consciousness and self health care consciousness, pure natural, no pollution and high quality milk and milk production has become mutual recognition for more consumers, therefore, organic milk and related production are developing as a main-stream of milk consumption in developed countries, and have a massive potential market. In China, higher quality milk is needed to meet the increasing quantity of milk source requirement; people don’t just satisfy with green food and turn into organic food.

The country carried out “Standard of OFDC Organic Certification” in 2003, but true organic milk production hasn’t gone on smoothly.

PUTTING FORWARD OF ORGANIC MILK SOURCE BASE CONSTRUCTION Organic milk is based on existing organic agricultural produce system, forbidden to use synthetic chemical substances such as fertilizers, pesticide, hormone, growth regulators, food additive and so on during the process of planting and cultivating, obey the standard of organic food production, process, packing, storage and transport, have perfect quality following system and produce and sell record, must be certified by self-governed state certification authority. Organic milk beyond the thought only pay attention to the influence of conventional milk and organic milk production on human health, and pay more attention to dairy industry sustainable development, more humanization to dairy cattle.

Organic food is safe food in the world, the production and development of organic milk and organic milk production should be paid more attention at present. The price of organic milk is 37% higher than that of conventional milk in the European market, and in Germany is more than 40%. “China Food Industry Science and Technology Development Compendium during the year of 2006 to 2016” definitely put forward developing organic milk rapidly. At present the domestic organic milk production is still in the beginning stage, only one pure milk produced by Inner Mongolia Yun Hai Qiu Lin Pasturage Corporation Limited has passed state organic food certification authority. Erie group gained “Organic Dairy Cattle Refined Feed Processing” authentication and “Organic Milk Powder Processing” authentication in June, 2006, now is preparing the work of organic milk coming into the market. In August, 2006 Bright Dairy Corporation put forward that all dairy be carried out antibiotic-free production and stride forward to organic milk step by step.

Milk resource production is chief approach to develop organic milk. In order to suit large-scale organic milk production, the conception of organic milk source base construction was put forward which includes special feeding management system construction, thoroughbred breeding system construction, feed supply system construction, epidemic disease and prevention construction, quality inspect system construction, manual and wastewater treatment system construction, technology service system construction and so on for producing eligible organic milk. From several aspects mentioned above, every aspect will be strictly monitored to realize “health raising” and achieve sustainable development. This article studies on three aspects of livestock raising techniques, livestock facilities structure and environment control management system.

RAISING TECHNIQUES Organic milk source production commonly adopted large-scale dairy cattle raising farm method, since the produce process of other methods such as corporation plus farmer and farmer breeding freely is difficulty to monitor, and it is hard to guarantee milk quality. Aim at the high quality requirement of organic milk, organic milk source base construction has many differences of raising techniques with conventional cattle.

The Introduction of New Varieties The genetic dominance should be considered in the process of introduction new varieties of organic dairy cattle which are healthy. Calves should be bred on the organic farm and be fed according to standard requirement of organic agriculture after birth, and introduced dairy cattle can’t be transferred between organic and non-organic produce units. Dairy cattle through embryo transplant or GMO (genetic modified organism) were forbidden to use. When there are no enough dairy cattle from organic farms, they can be bought from non-

organic farms, but the quantity of dairy cattle from non-organic farms can't beyond 10%. New building dairy cattle raising farm can import conventional dairy cattle over 10% while not beyond 40%.

Calves should be fed by dairy cattle after birth, and eat enough beestings. Calves are forbidden early weanling or using substitute. In an emergency condition (such as cattle post-partum death) it is allowed to use the same type of organic milk to feed lactation calves. The later lactation calves can be fed substitute, but can't contain antibiotics, chemical synthesis additives, animals butcher production and so on. Calf lactation is at least 3 months.

Because of lactation calves always accompanied by milking cattle, so milking cattle on the whole dairy cattle farm are divided more groups than conventional dairy cattle farm, commonly four groups (include one inspection group).

Feed "Standard of OFDC Organic Certification" prescribed that organic poultry or livestock feed was at least 80% from certified organic produce and byproduct, other feeds should meet organic produce standard, and at least 50% organic feed material composing should come from organic farm or other local organic farm. Mineral and vitamin can be used only when they come from the nature. If these matter are deficient, mineral and vitamin which is chemical purified and has the similar effect allows to be used, but must be ratified by Ministry of Agriculture of the People's Republic of China, strictly tested and certified by government agency and gain official registration.

Based on above prescription, large-scale organic dairy cattle base commonly needs fixed organic feed produce region; especially ensure enough ensile plant area. Commonly every adult milking cattle needs corresponding ensile farm from 0.27hm² to 0.33hm². Ensile additive can't come from genetic modified organism or derivate product, but chemical synthesis lactic acid, formic acid, acetic acid, metacetic acid or other natural organic acid product can be used when climate circumstances don't permit doing silage fermentation and can't gain certification authority admission, these ways can strictly control the quality of milk source from feed source.

Disease Prevention and Treatment Disease prevention and treatment on the large-scale cattle farm is an emphases and difficulty during produce process, especially on organic milk source produce cattle farm, it is more strictly with prevention requirement of dairy cattle disease. In order to ensure the quality of milk, the biological treatment and physical therapy-based method were advocated for disease control and prevention, supplemented by the drug therapy. And try to reduce the use of vaccine and medicine. Therefore we should take the following measures during produce process.

- 1) Choose dairy cattle suiting local conditions and have strong ability of disease-resistant;
- 2) Dairy cattle suitable for subgroup breed. Milking cattle should be controlled below 100 heads, and reserve cattle be controlled below 50 heads. Different groups by managed in different ways to strength dairy cattle disease-resistant ability and epidemic preventing ability.
- 3) Not recommend using vaccine inoculation commonly, the vaccine permitted to use should accord with related rules and ancillary ordinance. Live virus vaccine produced in GMO method was forbidden.

4) Sick or hurt dairy cattle should be segregated and cured immediately once discovered. Choosing priority biological therapy and physical therapy, and then choose medication. Medication should be diagnosed by veterinarian and permitted by certification authority. Milking cattle should milk solely during isolation therapy period, and milk can't mix with normal milk. Therefore it is best to equip mobile milking machine.

5) Keep reasonable indoor and outdoor room, feed density of organic milk cattle farm shown in table 1.

Table 1 Required area of different varieties of dairy cattle

Variety	Milking cattle	Pregnancy cattle	Adult cattle	Reserve cattle	Calf
Indoor area□m ² □	12	18	10	9	7
Outdoor area□m ² □	30	30	30	25	15

LIVESTOCK FACILITIES STRUCTURE China has a vast territory and great climate difference, but optimal habitation of dairy cattle is the similar. In order to produce more and high quality milk, optimal habitation should be built for dairy cattle. According to climate condition, dairy cattle raising zone can be divided into four climate types of dry-hot, wet-hot, dry-cold and wet-cold. To suit different climate types, cattle house has some difference in main body structure, covering material, ventilation method, feed method, drinking method and so on. The design of cattle house adopts “Customized according to size” mold, and no uniform mode.

The main body structure of cattle house chooses light steel structure which builds fast, well for epidemic prevention and disinfection, and is widely used on new-built large-scale cattle farm. Covering material adopts color steel sandwiched plate which has good characteristics of heat insulation, reasonable price and fast installation. There are bovine jugular flails and byres in dairy cattle house, byres using rubber mattress, and automatic water supply equipment were set to create clean and safe inner-environment.

Ventilation and cooling should be noticed when building dairy cattle house in dry-hot area, spray cooling system and forced exhaust fan were mounted in the house shown in Fig 1. Dairy cattle house Dehumidification and cooling should be considered in wet-hot area when building the dairy cattle house, it need to set a large moist discharge port and large capacity fan or roller window set on side wall to save building price shown in Fig 2. While temperature should be kept in dry-cold area when building the house and water supply equipment need do be treated for heat preservation, day lighting appliance was set on the rooftop which can fully use solar energy shown in Fig 3. Dairy cattle house in wet-cold area is hardest to handle, it is important for preserving heat as well as exhausting moisture, it can be solved by combining lighting belt and roof fans together. Water supply equipment also need to be treated for heat preservation, electrical water heater can be used if necessary to ensure drinking water being over five centigrade shown in Fig 4.



Fig 1. Opened cattle house in dry-hot area (fan and spray cooling)



Fig 2. Double sloped cattle house in wet-hot area (electrical window system on the top)



Fig 3. Cattle house in dry-cold area (lighting belt on the top)



Fig 4. Multi-span cattle house in wet-cold area (lighting belt and forced aerator on the top)

Assembled cattle house which has been designed and applied widely is regarded as the most perfect building and has got Chinese patent ZL200320126599.0. Assembled cattle house has the

following advantages compared with conventional cattle house: 1) by using new material, new process and new technique. Assembled cattle houses adopt the mode of factorial produce and assembling onsite, fast building, saving building cost and significant economic effect. 2) Fully consider biology characteristic of dairy cattle and raising techniques, and meet the demand of large-scale production and animal welfare of raising environment. 3) Equipping with ventilation system, environmental control system, dung cleaning system and so on. From three aspects of physical factor, chemical factor and biological factor to control dairy cattle raising environment, by using manual method to eliminate environmental disadvantages and create favorable condition to get comfortable & steady environment and gain satisfied raising effect.

ENVIRONMENTAL CONTROL The environment demand of Organic milk source base is more than that of conventional cattle farm, it not only needs surrounding environment not influence production, but also local production can not destroy surrounding environment. The environmental control of organic milk source base mainly includes disinfection & isolation and dung treatment.

Disinfection and Isolation Because organic milk source base environment is vulnerable and foreign disease easy to invade, the usage of vaccine and veterinary medicine should be strictly controlled in produce process, the best method which can keep disease beyond milk source base is disinfection and isolation which includes inner disinfection and natural region isolation.

The location of organic milk source base must be paid more attention before building; its distance is no less than 2000m from residential area and other stock farm and more than 1000m from heavy traffic road. There is no chemical plant, slaughterhouse, tannery which is easy to pollute within 3000m, and pay attention to natural isolation. The isolation of every region must have a good layout especially between produce region and other regions. Under normal circumstance, the shortest straight-line distance between produce region and other regions (feed region, office zone and living district, dung treatment region, isolation region etc.) should be more than 100m, and evanescence belt can be used if condition is permitted. Isolation region is located beyond 200m from produce region, under the lee of whole year prevailing wind or the lowest area in the farm. The distance from dung treatment area to office zone and living district is more than 200m, and more than 100m to produce zone. Therefore, under the same raising scale, the cattle farm producing organic milk is much larger than conventional cattle farm.

Disinfection facilities should be set at the gate of cattle farm and the entrance of every region, such as vehicle disinfection tank, disinfection tank with pedal lift, bath and changing room, ultraviolet germicidal lamp and so on. All personnel are not allowed to access to produce region until bathing, changing dungaree, and disinfecting 3minutes by ultraviolet radiation. The whole region must set washroom suiting with the number of the staffs and workers.

Dung Treatment The collection of cattle dung usually adopts dry conservancy way to separate urine and dung. Excretion is concentrated to waste handling area to be processed.

There are several types of dung treatment, the typical way is making organic fertilizer by high temperature stockpile manure fermentation shown in Fig 5. If fertilizer comforts to “Sanitation standard of innocuous dung” □GB7959□, they can be carried out and fertilized on ensile land. The sewage can be discharged outside through biochemical treatment and comforts to “Integrated wastewater discharge standard” □GB 8978-1996. Advanced water treatment technology such as

film biology technology can treat sewage from cattle farm and meet the requirement of regenerated water and can be used for flushing water. The other sewage treatment technology is making firedamp by using dung and urine together, firedamp can be used for energy and billabong broken bits and billabong fluid can be used as fertilizer on ensile land.



Fig.5 Fermentation treatment plant with high temperature

CONCLUSION Chinese organic milk source base construction is just at the beginning; we can obtain criterion step by step through ceaseless improvement. With the appearance of new techniques, new technology and new material, organic milk source base construction will be enriched new context, a mode of dairy cattle “health raising” will be formed which can provide technique support to suit the situation of our country and the development of organic milk source base construction, to meet the sustainable development of dairy industry and high grade quality organic milk production, and impulse dairy industry developed healthily.

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