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Opinion

Strengthen detection of raw milk somatic cell count – the first step for China milk quality improvement

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Milk is a healthy natural beverage and the main raw material of dairy products. It is well known that raw milk is the first link to guarantee and control the quality and safety of milk and dairy products. Only high-quality raw milk can produce high-quality dairy products. Bovine milk somatic cells are predominantly composed of mammary epithelial cells and white cells. Mammary epithelial cells can be released into milk along with milk-secreting and mammary gland metabolism. Because of infection and inflammation in the mammary gland, white cells can be expelled from mammary gland secretory tissues and enters milk, including macrophages, lymphocytes and polymorphonuclear leukocytes, which is a result of fighting against inflammation. Somatic cell count (SCC) in milk refers to the number of somatic cells that is correlative with animal age, lactation stage, mammary infection, living environment, and so on. SCC is used worldwide as an indicator of the health status of dairy animals and reflects the quality and safety of raw milk [1,2]. Therefore, the somatic cell count in milk can be used as one of the important indicators of milk quality and breast health.

Nowadays, China is committed to promoting the dairy industry to achieve the level of the United States and European countries, and both the number of large-scale dairy farms and milk production has risen greatly. Meanwhile, the China National Dairy Industry Technology System (NDITS) and Dairy Association of China (DAC) play important roles in the management and development of the dairy industry. According to the National Bureau of Statistics, China's fresh bovine milk production has reached 36.83 million tons in 2021. However,

there is no national standard for raw milk SCC limit in China. Thus, I would like to share my personal opinion on raw milk quality control and safety assurance focusing on SCC detection status.

Firstly, assign SCC detection to the monitoring range of raw milk quality control. Similar to the practice of developed countries, China's dairy industry has also actively carried out research and action on the quality control of fresh milk. According to NDITS, the detection of antibiotics and multidrug-resistant bacteria in liquid milk has become quality control parameters of raw cow milk, but SCC failed to be included (NDITS, 2022). Although increasing somatic cells in milk increase the potential risk of antibiotics and pathogenic bacteria (Gonzalo et al., 2010) [3], excessive somatic cell counts can cause changes in major milk components, such as protein, fat, lactose, and enzymes, which subsequently impact the quality of milk product during processing and storage [1,4]. Therefore, the quality control of raw milk should be monitored by SCC detection in NDITS.

Secondly, extend the detection scale and establish national standards for SCC detection. Under normal circumstances, the somatic cell count of milk is 2.0×10^5 to 3.0×10^5 CFU/mL. As an effective index to evaluate the quality of raw milk, the somatic cell count has been limited in many countries. Different countries have set different standards for the limit of somatic cell numbers in dairy milk. For example, the SCC in milk is less than 3.5×10^5 CFU/mL in Switzerland; 4.0×10^5 CFU/mL in EU, Australia, and New Zealand; 4.5×10^5 CFU/mL in Denmark;



5.0×10^5 CFU/mL in Canada. Russia sets a limit of less than 7.0×10^5 CFU/mL, while the United States pasteurized milk regulation sets a limit of less than 7.5×10^5 CFU/mL, and countries are considering further raising the limit [5]. However, China's national standard has not established a limit on the somatic cell count in raw milk. Meanwhile, China has 6.2 million dairy cows until 2021, and about 1.48 million cows are involved in SCC detection and the average number of SCC is 2.36×10^5 CFU/mL (Figure 1), which has been decreasing for the past five years (DAC, 2022). In my opinion, the range or proportion of raw milk SCC detection is still small in China. This may be one of the reasons for the failure to develop national standards. In addition, the continuous decline of raw milk SCC is noteworthy. After all, other countries are considering raising SCC limits.

Finally, strengthen monitoring for free-range and small-scale dairy farming. China is a vast country with uneven development, and free-range and small-scale dairy farming still occupies a certain proportion. For these small farms, SCC detection in raw milk may not be strict. The small farm frequently utilizes brief and limited accuracy methods, such as the California mastitis test (CMT) or Lanzhou mastitis test (LMT), to indicate milk SCC or breast health instead of direct

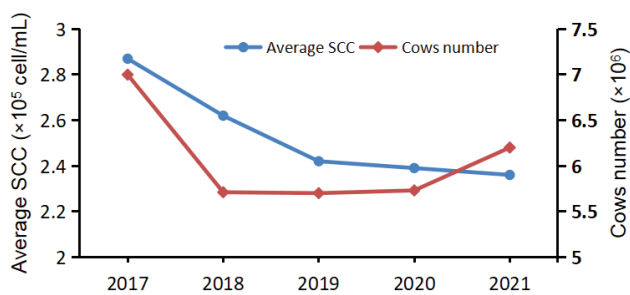


Figure 1: Average numbers of SCC past 5 years.

methods, such as Fossomatic FC analyzer or Coulter counter. There may be some hidden problems with quality control and safety. Therefore, NDITS and DAC should attach importance to these risks in raw milk and promote supervision and device upgrades for SCC detection in small farms.

In summary, China's quality control and safety inspection of raw milk are still in need of improvement. At present, SCC detection in raw milk should be valued as the first step and mainly involves three aspects: extending SCC detection, establishing a limit of raw milk SCC as a national standard, and making small farm SCC detection strict. In order to further strengthen the quality and safety of milk, China should pay more attention to SCC monitoring in raw milk, and take it as the first important step for milk safety and quality guarantee.

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