Traceability as a tool for managing the economic viability of a poultry enterprise

S I Valdokhina and L M Roiter
Federal Scientific Center All-Russian Research and Technological Poultry Institute of Russian Academy of Sciences, 10, Ptitsegradskaya str., Sergiev Posad, Moscow region, 141311, Russia
Email: svetlana.valdohina@mail.ru

Abstract. The purpose of the article is to consider the traceability system of poultry products from the perspective of a tool for managing economic viability. The analysis of the main indicators of the industry, which indicate the ambiguity of their quantitative and qualitative characteristics, was carried out. Relative to the first position, the industry has a positive trend, and the second is integrated in financial results, the magnitude of which depends on external and internal factors and, above all, on the competitiveness of poultry products, which can be achieved by implementing quality management and traceability systems. The results of analytics of individual industry leaders confirm this conclusion. A fragmented substantive study of this problem is illustrated by the example of a slaughter and processing workshop with access to relevant recommendations.

1. Introduction
Poultry farming is a modern subsector of livestock, which is building up its potential, ensuring the food security of the country.

Today, the mission of the enterprise is customer satisfaction in accordance with regulated quality standards and requirements (corresponding to GOST, industry standard (OST), ISO 22000). Fulfilment of these requirements enables the company to produce competitive products, thereby increasing the efficiency of its functioning and business image.

2. Research results
According to the results for 2010-2018, the industry is characterized by a number of indicators, such as overall production and consumption of poultry meat in slaughter mass, production and consumption of eggs throughout the country, and per capita (figures 1-6).

An analysis of the industry indicates a positive trend in egg and poultry production. According to the Rosptitseouz there was an increased production of poultry meat in slaughter weight, starting from 2855 thousand tons in 2010 to 5000 thousand tons in 2018 (almost 2 times) for all categories of businesses, as can be seen in figure 1. Egg production by 2018 year increased to 45.2 billion pieces, which is 10.8% more compared to 2010 (figure 2). Regarding the per capita eggs and poultry meat production and consumption the situation is as follows: egg production is ahead of per capita consumption, which indicates the complete provision of the population with eggs of their own production throughout the entire study period, with regard to poultry meat, their full supply per capita was achieved by 2017 - 2018, as can be seen in figures 3-4.
Export of poultry meat amounted to 200 thousand tons, which is 180.7 thousand tons more than the 2010 level (almost 10 times). The import of poultry meat from abroad to Russia decreased from 688 thousand tons in 2010 to 230 thousand tons in 2018 (almost 3 times). The level of self-sufficiency in poultry meat reached 99.6%. Russia fully provides itself with its own primary products in 2018, as evidenced by the figure of 5.030 thousand tons, 1.5 times increased compared to 2010, amounting to 3.524 thousand tons of poultry meat, as illustrated in Figure 5.

There is a positive downward trend in imports of edible eggs, which are mainly supplied from Belarus and amount to 823 million pieces in 2018, which is 8.7% lower than in 2010. Regarding exports, the situation is as follows: the growth of food eggs increased by 119.6% and amounted to 535 million pieces in 2018, which is more than 2 times higher than in 2010, when export amounted to only 243.6 million pieces, which can be seen in figure 6.

**Figure 1.** Production of poultry meat in slaughter mass in Russia, thousand tons, 2010-2018.

**Figure 2.** Egg production in Russia, billion pieces, 2010-2018.
Figure 3. Production of eggs and poultry meat per capita, 2010-2018.

Figure 4. Egg and poultry meat consumption per capita, 2010-2018.

Figure 5. The formation of the poultry meat market, thousand tons, 2010-2018.
However, the performance of the industry is declining. Thus, the profitability decreased by almost 10% for both eggs and poultry for the period from 2015 to 2018.

This situation is associated with a number of factors of internal and external nature, such as: inflation, a decline in population solvency, the exchange rate, an increase in the debt load on one ruble of own capital, a decrease in the security of liabilities with own property, an increase in the share of stocks in the structure of current assets, and a disparity in prices for consumed resources and sold poultry products, imbalance of investment funds, which are mainly concentrated in large producers.

At the same time, this situation is not typical for all poultry enterprises, among them there are leaders who occupy a significant share in production volumes and are economically wealthy business entities. For instance, the egg production of cross hens in 2018 with a volume of more than 1 million eggs is typical for such large enterprises as JSC Poultry Farm Sinyavinskaya, JSC Volzhanin, JSC Poultry Farm Roskar, PJSC Poultry Farm Borovskaya, the volume of egg production which amounted to 1317.7 million pieces; 1302 million pieces, 1149 million pieces, 1014.1 million pieces, respectively, which makes up 14% of the total share (Table 1). Broiler meat production with volumes of more than 200 thousand tons makes up 22% of enterprises, such as Prioskolie CJSC, Belgorod Region, Stavropol Broiler CJSC, Severnaya Poultry Factory, Leningrad Region, Belgrankorm LLC, Belgorod Region (table 2).

Table 1. Egg production of cross hens in 2018 with a volume of more than 1 million eggs, (volume - million pieces, share - %).

| Enterprise                        | 2018   | Share in egg production of cross hens,% |
|-----------------------------------|--------|----------------------------------------|
| JSC Poultry Farm Sinyavinskaya    | 1317.7 | 4.00                                   |
| JSC Volzhanin                    | 1302   | 4.00                                   |
| JSC Poultry Farm Roskar          | 1149   | 3.50                                   |
| PJSC Poultry Farm Borovskaya     | 1014.1 | 3.10                                   |
| Total                            | 4782.8 | 14.60                                  |
Table 2. Broiler meat production in 2018 with volume more than 200.0 thousand tons (volume - thousand tons of live weight, share -%).

| Enterprise                                      | 2018   | Share in broiler production, % |
|------------------------------------------------|--------|--------------------------------|
| Prioskoli CJSC, Belgorod Region                 | 430.00 | 7.70                           |
| Stavropol Broiler CJSC                          | 314.00 | 5.60                           |
| Severnaya Poultry Factory, Leningrad Region    | 251.80 | 4.50                           |
| Belgrankorm LLC, Belgorod Region                | 206.00 | 3.70                           |
| Total                                          | 1201.80| 21.50                          |

The success and leadership of these enterprises is primarily due to the fact that they have implemented the QMS (Quality Management System) and fully implemented a traceability system that acts as a tool for managing the business processes of the poultry enterprise, the results of which are integrated as their products in accordance with GOST R ISO 22005-2009 “Traceability in the chain of feed and food production”, which fully meets the needs of consumers of poultry products [1].

In the industry, the implementation of the traceability system was carried out in stages in accordance with the scheme shown in figure 7.

![Figure 7. Stages of design and implementation of a traceability system.](image)

The implementation of the traceability system provides for a clear differentiation of the business processes of an economic entity. An integrated model of enterprise business operation has been developed in poultry farming, according to which 3 main blocks of stages are distinguished, namely, management (management processes), production (main processes of the product life cycle), auxiliary control processes (supporting processes) [2].

Analytics of the business process traceability system showed that the problem zone is the process of “poultry slaughter and product processing”, which subsequently leads to a decrease in its
competitiveness. At the same time, crises associated with food safety have made consumers particularly attentive to traceability technologies [3-4]. In this regard, this can be reasoned by demonstrating a traceability system for the “Slaughter and Processing” business operation (figure 8).

![Diagram](image)

**Figure 8.** Internal traceability system for a slaughterhouse in a poultry farm.

As can be seen from the above diagram, each stage of this business process has its own document flow, characterized by direct and feedback. This approach enables to identify certain discrepancies in the process of slaughter of birds [5].

An important factor in the traceability system is the technical specification, on the basis of which a list of recorded data for traceability is determined for all stages of the process [5]. This list is graphically presented in figure 9.
Figure 9. Stage of technical specification for the production site of deep-frozen mechanically deboned meat.
The implementation of a traceability system has certain risks associated with the lack of quick data analysis systems, the lack of quick identification of critical factors affecting the adoption of objective measures in identifying hazardous products, and the lack of effective tools for monitoring poultry production processes throughout the chain and at all sites, while tracking deviations in the microclimate and the state of production facilities in real mode [5]. These deficiencies lead to difficulties in their timely elimination in the absence of a single information space of the organization and interconnected production data, the possibility of operational analysis to make informed production and management decisions.

Today, the neutralization of these risks can be solved by digitalizing information based on IT technology with traceability, which will increase the degree of reliability, speed of response, a high degree of protection against data loss, ease of maintenance and data recovery, system flexibility in relation to extensions and modifications.

3. Conclusions
After analyzing the above data, it was found that the industry is increasing volumes, but from the point of view of adding value, which increases the cost of the final product, the picture looks different, that is, the industry has a profitability of 3–5%, which does not allow it to conduct expanded reproduction, introduce innovation, that is, most enterprises are in survival mode. First of all, this affects the loss of competitiveness, both of the enterprise itself and of its products. Along with the solution of many tasks facing business entities, one of the global ones is the quality of their products, which can be achieved only if QMS and a traceability system are implemented [6, 7].

There are developments in the industry for these systems of methodological and applied nature, which are considered by the authors in a number of publications and some of their fragments are presented in the current paper and are integrated in the conclusions of the results of the study.

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