Methodological indicators of economic security of poultry enterprises

L M Roiter
Federal State Budgetary Scientific Institution Federal Scientific Center "All-Russian Research and Technological Institute of Poultry" of the Russian Academy of Sciences, 10, Ptitsegradskaya St., Sergiev Posad, Moscow region, 141311, Russia

E-mail: Department.economy.vnitip@yandex.ru

Abstract. The article deals with the actual problem of ensuring the economic security of poultry enterprises. The current state of development of economic entities in the industry is characterized from the standpoint of violation of their financial potential. It has been proved that the growth of quantitative indicators of the volume of poultry products produced is not a criterion for the economic security of industry enterprises. The dynamics of absolute and relative financial indicators on average in the industry indicates a lack of resources for the implementation of the entire production process. In this regard, an assessment of the economic security of poultry enterprises is given using traditional indicators of such analytics and modern models that optimize the balance structure. The analysis of the economic security of a particular poultry enterprise is carried out according to certain methods and the conclusion is given that the values of the criteria characterizing the financial position, business activity, as well as the return and capacity of the property are lower than their standard values. Consequently, the statement of the fact of assessing the economic security of an economic entity in the industry is not enough. The development of appropriate management decisions based on an optimization model of the transition from an unsatisfactory balance sheet structure to a satisfactory one is required. Эта пошаговая процедура была проведена с выходом на баланс с положительной структурой. This step-by-step procedure was carried out with an exit to a balance sheet with a positive structure. Thus, the present methodological basis for assessing the economic security of any business entity requires an integrated approach to solving this issue.

1. Introduction
The issues of economic security of business entities of the industry in the context of increasing sanctions from the European Union and the United States, reforming the structure of the economy is becoming an extremely urgent problem, requiring the search for mechanisms to ensure effective protection of poultry enterprises potential [1].

A review of scientific works related to the topic under study indicates a sufficient information base, where fundamental approaches to the disclosure of certain aspects of the system of ensuring the economic security of poultry enterprises are considered. At the same time, it should be noted that there are significant problems in the development of mechanisms for increasing the economic security of economic entities of the industry, taking into account the peculiarities of poultry farming and destructive factors that affect the economic viability of poultry enterprises, and therefore, the adequate safety of their functioning [2].
In this regard, the importance of the theoretical and practical substantiation of this problem is increasing from the standpoint of understanding the essence of the economic security of poultry enterprises and indicators characterizing it, as well as in the development of directions for increasing the economic security of producers of poultry products [3].

2. Research results
In order to confirm the relevance of the problem, tasks were set, the sequence of implementation of which has logical completeness.

A preliminary fragmentary analysis of the industry was carried out according to the main technical, economic and financial indicators [4].

Poultry farming is still the most demanded sub-industry among other livestock sub-sectors. This is confirmed by the data of the National Project and the State Program for Agriculture Development.

It should be noted that the poultry products market operates in a difficult economic situation, which is characterized by a decrease in the purchasing power of the population with an increase in the supply of products, with a persisting disparity in prices for consumed resources and products sold, which ultimately leads to a decrease in the economic security of a number of economic entities of the industry and their bankruptcy [5].

For the period from 2015 to 2019, the increase in poultry meat production in slaughter weight is characterized by the value of 473 thousand tons, and in comparison, with 2018, this increase corresponds to 102 thousand tons. Moreover, the share of poultry meat production remains at the level of 46% against the background of 26.4% in terms of the specific weight of poultry meat in the total volume of animal protein.

A similarly positive trend is characteristic of egg development strategy, the increase in production for which over 5 years (2015-2019) amounted to 2348 million pieces against the background of a slight decrease in its volume in 2019 compared to 2018 by 43.1 million pieces. The share of eggs in the total volume of animal protein is 10.6%.

This situation is due to the closure of a number of egg production enterprises (CJSC "Gvardeets" of the Novgorod region, OJSC "Poultry farm Snezhka" in the Bryansk region, one of the enterprises included in the AO firm "Agrocomplex"). At the same time, egg production at LLC Ptitsefabrika Inskaya has been reduced.

The prospects for the development of the poultry industry will continue by 2024, the volume of egg production will be 46.1 billion pieces, and poultry meat - 5550 thousand tons of slaughter weight.

An increase in export positions for these types of products was noted, namely for poultry meat for a five-year period, the increase amounted to 138.2 thousand tons of slaughter weight, and in relation to the previous year, this value was noted at the level of 24.8 thousand tons of slaughter weight.

The export of edible eggs for the same periods is characterized by correspondingly incremental values of 384.9 million pieces and 16.5 million pieces.

At the same time, external factors such as inflation, exchange rates, the level of the population's ability to pay, an increase in the debt burden per ruble of equity capital, and continued dependence on imports of breeding products also have a significant impact on the performance of enterprises in the industry. The prime cost of one day broiler chicks increased by 6% over the five-year period, and by 4.2% compared to the previous year [6].

The selling prices have also undergone significant changes. In 2019, the growth for eggs was 7%, and for broiler meat 10%. While feed ingredients have increased by 33%, and compound feed for poultry by only 12%. That is, there is a clear bias in the consumed resources towards their significant growth against the background of lower growth rates in selling prices. This situation had an impact on the level of profitability from sales, which in 2018 was 9.2%, and in 2019 it was 3.6%. For poultry meat, this indicator is at the level of 6% in both 2018 and 2019. Taking into account management costs, the value of this indicator will significantly decrease for most poultry enterprises, down to negative values.
Against the background of the growth of liabilities of economic entities of the industry for long-term liabilities and accounts payable, enterprises are forced to attract short-term loans to cover the shortage of working capital [7].

The industry analysts indicate a decrease in the economic security of its economic entities. The number of enterprises that can be classified as economically insolvent according to the criteria "net asset value" is less than the authorized capital is more than 30.4%. Moreover, on September 1, 2020, within the group, there was a tendency to an increase in their number (more than 16.1%), for which bankruptcy proceedings were opened, while the number of economic entities in the industry increased (10.9%), where a liquidation commission was formed. This tendency is increasing every year due to the pressure on the industry enterprises of external and internal factors that have led to a decrease in economic security.

According to the results of the analysis of poultry industry in recent years, it was established that certain threats exist that impede its safe functioning. This situation was the starting point for the implementation of the task, which is to study methodological indicators of economic security of business entities in the industry and substantiate their performance in the appropriate assessment.

The economic security of an enterprise is the state of the most efficient use of its resources to prevent, mitigate and protect against existing dangers and threats or other unforeseen circumstances and to ensure the stable operation of the enterprise in the future.

To ensure the economic security of the enterprise, it is necessary that the enterprise has its own security system, which depends on the level of development and structure of production potential, the efficiency of its use and the direction of its activities.

The organization of the economic security of the enterprise is implemented in areas such as financial, intellectual, personnel, technical and technological, political and legal, information. The implementation of all elements of economic security and their effectiveness is focused on the indicators of the financial component [2].

Indicators are one of the main methods of economic diagnostics of an enterprise and the main tool for predicting bankruptcy [8].

The block of financial condition, business activity and efficiency of potential use act as traditional indicators of economic security.

A sample of a number of enterprises in the industry with the most frequent values according to these criteria shows that almost all liquidity indicators do not correspond to the standard value. With regard to financial stability, we can state a decrease in its value and insufficient provision of current assets with own circulating assets in 2018-2020, which can be seen from table 1.

This indicates a decrease in the share of sustainable funding sources. Financing from own funds and long-term sources in the amount of 60% is considered the norm. At the same time, an increase in the level of the coefficient of flexibility indicates that in 2020 40% of permanent liabilities are in a flexible form, which, if necessary, can be taken out of business without significant losses.

### Table 1. Analysis of liquidity indicators and coefficients of the company's capital structure.

| Indicator                        | Standard       | Year 2018 | Year 2019 | Year 2020 | Variation 2020 г. к 2018 г. | Variation 2020 г. к 2019 г. |
|----------------------------------|----------------|-----------|-----------|-----------|---------------------------|---------------------------|
| Total liquidity                  | >1             | 2.22      | 0.78      | 0.75      | -1.47                     | -0.03                     |
| Absolute liquidity              | >0.1-0.2       | 0.16      | 0.03      | 0.01      | -0.15                     | -0.02                     |
| Interim liquidity               | >0.7-1         | 1.00      | 0.40      | 0.51      | -0.49                     | 0.11                      |
| Current liquidity               | >1-2           | 3.04      | 1.95      | 1.96      | -1.08                     | 0.01                      |
| Financial autonomy ratio (independence) |               | >0.5      | 0.71      | 0.59      | -0.1                      | 0.02                      |
| Financial stability ratio       | >0.75          | 0.77      | 0.64      | 0.68      | -0.09                     | 0.04                      |
Financial activity ratio | <1 | 0.42 | 0.70 | 0.63 | 0.21 | -0.07
Dependency ratio | <0.5 | 0.29 | 0.41 | 0.39 | 0.1 | -0.02
Provision of circulating assets (CA) with own circulating assets | >0.1 | 0.58 | 0.41 | 0.39 | -0.19 | -0.02
Provision of CA with its own circulating and equivalent funds | >0.6 | 0.67 | 0.49 | 0.49 | -0.18 | 0.004
Equity capital flexibility | >0.1 | 0.57 | 0.48 | 0.40 | -0.17 | -0.08

Thus, the growth of the assets of the poultry enterprise was almost fully financed by short-term liabilities, which led to a decrease in financial stability indicators and a violation of the company's solvency, figure 1.

Figure 1. Determination of the type of financial stability.

These indicators correspond to the indicators of supply of stocks and costs by sources of their formation.
1. The condition of absolute financial stability is not met for the entire analyzed period.
2. The condition of normal financial stability is met only for 2011, for the rest of the years it is not met.
3. The condition of an unstable (pre-crisis) financial condition is characteristic of both the reporting and the previous year.

Based on this, it follows that the degree of provision of reserves with "normal" sources of financing decreases compared to the base year (2018) and, thus, to finance the operating cycle, most of which in the balance sheet looks like reserves, the company attracts all possible sources, its own circulating funds, long-term and short-term liabilities.

As for the analysis of indicators of business activity, they include 2 groups: turnover and profitability. The results are presented in table 2, from which one can see the acceleration of the turnover of current assets and, first of all, due to the increase in the turnover of inventories and receivables in comparison with the base period.
Table 2. Analysis of turnover indicators.

| Indicator                  | Year 2018 | Year 2019 | Year 2020 | Variation 2020 г. к 2019 г | Variation 2020 г. к 2018 г |
|----------------------------|-----------|-----------|-----------|---------------------------|---------------------------|
| 1. Ratios of turnover of   |           |           |           |                           |                           |
| current assets             | 3.56      | 3.86      | 4.4       | 0.54                      | 0.84                      |
| stocks                     | 4.65      | 4.18      | 5.09      | 0.91                      | 0.44                      |
| accounts receivable        | 12.95     | 20.1      | 17.18     | -2.92                     | 4.23                      |
| accounts payable           | 13.46     | 11.49     | 11.6      | 0.11                      | -1.86                     |
| 2. Periods of turnover. days of |          |           |           |                           |                           |
| current assets             | 102.53    | 94.56     | 85.95     | -11.61                    | -19.58                    |
| stocks                     | 78.5      | 87.32     | 71.71     | -15.61                    | -6.79                     |
| accounts receivable        | 28.16     | 18.16     | 21.25     | 3.09                      | -6.91                     |
| accounts payable           | 27.11     | 31.77     | 31.47     | -0.3                      | 4.36                      |
| 3. Fixation factors        |           |           |           |                           |                           |
| stocks                     | 0.19      | 0.21      | 0.17      | -0.04                     | -0.02                     |
| accounts receivable        | 0.08      | 0.05      | 0.06      | 0.01                      | -0.02                     |

However, these rates are slowing down for accounts receivable, which in turn diverts money from circulation. It is advisable to compare the effectiveness of accounts receivable management with the indicators of accounts payable turnover and monitor their balance. It can be seen from the presented material that the period of turnover of accounts payable is longer than accounts receivable, and this, in turn, removes the problem of financing the operating cycle for the enterprise and brings a certain inflationary income.

There may be 2 reasons: problems with payment of obligations or skillful use of accounts payable as a short-term source of funds in turnover. This can be confirmed by calculating the effect of financial leverage for 2020, presented in table 3.

Table 3. Calculation of financial leverage effect.

| №  | Indicator                          | Значение |
|----|------------------------------------|----------|
| 1  | Financial leverage ratio           | 0.24     |
| 2  | Financial leverage differential, % | -6.95    |
| 3  | Financial leverage effect, %       | -1.67    |

The negative value of the differential of financial leverage indicates insufficient efficiency in the use of borrowed capital. The final results of the analysis of the three blocks that characterize the economic security of the economic entities of the industry indicate the need to search for modern models that allow structuring financial policy through expedient management decisions on the formation of property and sources of financing for poultry enterprises.

We will illustrate the adaptation of one of the corresponding models, namely: the balance structure optimization model, at a specific poultry enterprise.

As the conditions characterizing a satisfactory (unsatisfactory) balance structure, the following ratios are characterized:

Satisfactory structure  
\[ \text{CLR} = \frac{\text{CA}}{\text{КЗК}} \geq 2; \]

Unsatisfactory structure  
\[ \text{CLR} = \frac{\text{CA}}{\text{КЗК}} \leq 2 \]  

(1)
CLR = \frac{EC - NCA}{CA} \geq 0,1; \quad CLR = \frac{EC - NCA}{CA} \leq 0,1 \quad (2)

where CLR - current liquidity ratio,
CA - current assets,
SDC - short-term debt capital,
CPWC - coefficient of provision with own working capital,
EC - equity capital;
NCA - non-current assets.

To establish a normal structure of the balance sheet with its change by increasing or decreasing fixed assets and non-current assets, circulating assets, sources of own funds and short-term debt, it is advisable to use in various combinations with each other.

The calculations were made according to the methodological basis of the model developed by L.V. Dontsova N.A. and Nikiforova [9]

The studied poultry enterprise at the end of 2020:
KTL = 0.651 < 2, KOCC = -0.071 < 0.1

This ratio indicates an unsatisfactory balance sheet structure.

The original balance sheet has the form expressed in million rubles.

NCA = 1143 \quad EC = 1016
CA = 177 \quad SDC = 304
NCA + CA = 1320 \quad EC + SDC = 1320

It is necessary to draw up a scheme of production and financial policy within the framework of the second strategy:

NCA = 1143 - \delta \quad EC = 1016
CA = 177 + \delta - x \quad SDC = 304 - x
NCA + CA = 1320 - x \quad EC + SDC = 1320 - x

where, \delta, x are planned required volumes of decrease or increase of the corresponding indicator.

A relationship diagram, that allows you to determine various production and financial policies, has been drawn up:

228.6 \geq \delta = \max \{608 - 177 - x; (17.7 - 1016 + 1143 -0.1*x)/0.9; - 17.7 + x\}

With a pure strategy x = 0, the parameter \delta is determined from the relation:

228.6 \geq \delta = \max \{431; 160.8\}

Since 228.6 < 431, this policy is invalid.

With a pure strategy \delta = 0, the parameter x is determined from the relation:

17.7 \geq \delta = \max \{431; 160.8\}

Since 17.7 < 431, this policy is also invalid.

Thus, both net policies cannot be used to build a satisfactory balance sheet structure. Hence, mixed policies were considered.

These policies can be found from the ratio:

228.6 \geq \delta = \max \{431 - x; (144.7 - 0.1*x)/0.9; - 17.7 + x\}

where 0 < x < 304, \delta > 0

It can be seen from these ratios that the minimum allowable value is x = 202.4. Taking the step of change \varepsilon = 1, we obtain the feasible solutions, Table 4.
A rational policy should be considered a policy that is characterized by lower total potential sales and purchases, that is, a policy in which: 

\[(\delta + |\delta - x|) = \text{min}\]

This policy can be characterized by the structure of the consolidated balance sheet:

\[
\begin{align*}
\text{BA} &= 1143 - 228.6 = 914.4 \\
\text{EC} &= 1016 \\
\text{CA} &= 177 + 26.2 = 203.2 \\
\text{SDC} &= 304 - 202.4 = 101.6 \\
\text{A} &= 1117.6 \\
\text{P} &= 1117.6
\end{align*}
\]

For this policy:

\[
\begin{align*}
\text{CLR} &= \frac{\text{CA}}{\text{SDC}} = \frac{203.2}{101.6} = 2 \\
\text{CPWC} &= \left(\frac{\text{EC} - \text{BA}}{\text{CA}}\right) = \frac{1016 - 914.4}{203.2} = 0.5 > 0.1
\end{align*}
\]

Thus, this scheme of forming the balance structure has a priority when choosing a methodological basis for assessing the economic security of a poultry enterprise, since there is a variance in choosing a scheme based on the existing financial situation of an economic entity in the industry. Such approach of optimization of balance sheet structure contributes to rational distribution of funds and accumulation of equity capital.

**References**

[1] Manokhina N V 2018 *Economic security* (Infra-M) p 224
[2] Bogomolova V A 2015 *Economic security* (Infra-M) p 295
[3] Dontsova L Ivushkina O O and Dun I R 2014 *Effektiv regylator of economic competitiveness* 2 39
[4] Royter L M, Vedenkina I V, Zazykina L A, Akopyan A G and Valdokhina S I 2020 *World and Russian poultry farming: state, dynamics of development, innovative prospects. Proceedings of the XX International Conference. Russian branch of the World Scientific Association for Poultry (VNAP RF)* pp 728-731
[5] Baykina S G 2012 *Accounting and analysis of bankruptcy* (Dashkov and Co) p 108
[6] Savitskaya G V 2005 *Economic analysis: textbook* p 651
[7] Berdnikova L F, Portnova E S 2016 *Financial condition of the organization: concept and factors influencing it* 17 pp 372-374
[8] Ryakhovskaya A N, et al. 2020 *Bankruptcy and financial recovery of economic entities* (Yurayt Publishing House, Moscow) p 341
[9] Dontsova L V and Nikiforov N A 2004 *Analysis of financial statements: textbook 2nd ed.* (M.: Publishing house Business and Service) p 336

**Table 4.** Admissible solutions for constructing satisfactory structure of the balance of the poultry enterprise.

| Policy                              | 1   | 2   | 3   | 4   |
|-------------------------------------|-----|-----|-----|-----|
| Repayment of short-term debt (x)    | 202.4 | 203.4 | 204.4 | 205.4 |
| Reduction (sale) of fixed assets (\( \delta \)) | 228.6 | 227.6 | 226.6 | 225.6 |
| Decrease of working capital (\( \delta - x \)) | 26.2 | 24.2 | 22.2 | 20.2 |
| \( \delta + |\delta - x| \)          | 254.8 | 251.8 | 248.8 | 245.8 |