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COMPREHENSIVE ANALYSIS OF ASSETS IN AGRICULTURAL HOLDINGS: STRUCTURE, IMPACT ON FINANCIAL CONDITION AND SUBSIDY EFFECTS

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Abstract

The present study analyses the relationship between asset structure and financial sustainability of agricultural holdings in Bulgaria, using data from the Farm Accountancy Data Network (FADN) for the period 2014-2020. Through a combined approach of structural and correlation analysis, the study examines the connections between fixed and current assets, liquidity, and indebtedness in farms of different economic categories (from below 8 to above 500 thousand euros standard output). The results reveal a significant predominance of fixed over current assets across all categories, with a negative correlation observed between fixed assets and liquidity, particularly in small holdings. The study establishes that large farms demonstrate better ability to balance between long-term investments and maintaining liquidity, whilst small and medium-sized holdings show greater dependence on external financing for fixed asset acquisition. The analysis of subsidies reveals a differentiated role according to farm size - for small and medium-sized holdings, they are a primary source for financing fixed assets, whereas large farms use subsidies more flexibly, both for capital investments and maintaining short-term liquidity. The research identifies the need for differentiated asset management strategies according to the economic size of holdings, with small farms needing to focus on improving liquidity through more effective management of current assets. These findings provide valuable guidance for improving financial sustainability in the agricultural sector.

Key words**:** *agricultural holdings, asset structure, financial sustainability, liquidity, indebtedness, subsidies*

INTRODUCTION

The financial stability and sustainability of agricultural holdings are of paramount importance for their effective functioning and development in the dynamic and often unpredictable economic environment of modern agriculture. To achieve long-term sustainability and competitiveness, agricultural holdings must implement strategic and optimal management of their fixed and current assets, whilst maintaining a balanced and flexible structure of their liabilities.

Fixed assets play a key role in the production process, forming the foundation of farms' production capacity. They are a source of long-term stability and growth potential. On the other hand, current assets provide the vital liquidity necessary for covering current liabilities, financing operational activities, and maintaining financial flexibility in the short term.

Liquidity and indebtedness emerge as critical indicators for assessing the financial health of agricultural holdings. They not only reflect the farms' current ability to meet their short-term obligations but also provide insight into their long-term financial sustainability and ability to withstand economic shocks. The optimal ratio between fixed and current assets, combined with effective liability management, has a significant impact on the financial stability and adaptability of farms. This is particularly important in the context of growing economic uncertainty, variable market conditions, and increasingly unpredictable climate changes that can seriously impact agricultural production.

In this context, understanding the role of subsidies becomes particularly important. They can serve as a valuable tool for supporting asset management and reducing financial risk, providing additional liquidity and opportunities for reducing indebtedness. The effective integration of subsidies into the overall financial strategy of farms can

significantly improve their sustainability and competitiveness.

The present study focuses on the complex interaction between asset structure, liquidity, indebtedness, and overall financial sustainability of agricultural holdings across different economic categories. Through in-depth analysis of key financial indicators such as the current ratio, debt ratio, and the relationship between fixed and current assets, the study aims to reveal important patterns and dependencies. These findings could serve as a solid foundation for making informed management decisions in the dynamic and challenging agricultural sector.

Literature Review

Fixed assets in agricultural holdings typically include land, buildings, machinery, and equipment that are used over a long period and are not consumed in the short term. They are characterised by lower liquidity and usually require significant capital investments. Although these assets cannot be easily converted into cash, they play an essential role in the long-term sustainability and productivity of farms [23]. Current assets, on the other hand, include inventory, short-term receivables, and cash. They have high liquidity and can be easily converted into cash, making them important for covering current financial needs and maintaining the liquidity of agricultural holdings [1]. The balance between the two types of assets is key to the financial stability of farms. Optimal management of both types of assets is essential for maintaining the financial sustainability of agricultural holdings, as an imbalance between them can lead to liquidity problems or excessive investment in fixed assets, which reduces farm flexibility [3, 10].

Recent research on the relationship between assets and liabilities shows that the management of fixed and current assets in agricultural holdings cannot be viewed in isolation from liabilities and debt structure. This relationship is critical for financial stability and liquidity. According to studies on the ratio of fixed assets to long-term liabilities, farms with high levels of indebtedness tend to experience difficulties in meeting their short-term obligations, which can lead to financial distress. For example, studies on agricultural enterprises show that high levels of debt, especially if financed through long-term loans, can create challenges for farm liquidity [4]. This problem is exacerbated under adverse macroeconomic conditions, such as economic downturns or high interest rates.

Research on agricultural holdings in the European Union shows that high levels of fixed assets can lead to weaker liquidity. According to an analysis examining the relationship between liquidity and capital structure of Croatian firms, higher liquidity leads to reduced debt burden and improves the financial stability of holdings. Firms with more liquid assets tend to use fewer loans, which strengthens their ability to maintain liquidity [20]. Analysis of EU agricultural holdings' liquidity shows that fixed assets play an important role in long-term stability, but their excessive accumulation can limit flexibility. Research on EU farm investments finds that maintaining an optimal ratio between fixed assets and current liabilities is key to maintaining farm liquidity and profitability [12].

Despite the risks associated with excessive investment in fixed assets, they remain essential for the long-term profitability of agricultural holdings. Farms in Central Europe that rely on large investments in fixed assets often encounter difficulties in managing liquidity, especially during agricultural sector crises [17]. Balanced investments in fixed assets improve farm productivity and lead to better financial results in the long term. The impact of these assets on liquidity can be mitigated through prudent financing and capital management [21].

Current assets, such as inventory, short-term receivables, and cash, play a key role in ensuring liquidity in agricultural holdings. They have high liquidity, making them an important resource for covering current liabilities and maintaining financial flexibility. According to research on agricultural holdings in Bulgaria, current assets are sufficient to cover short-term liabilities, with the ratio between current assets and liabilities improving over the years [5]. Current asset

management is a key factor in maintaining agricultural holdings' liquidity. Research in Serbia shows that farms with better current asset management achieve greater flexibility in covering short-term liabilities and have lower indebtedness [19]. Researchers conclude that agricultural firms with well-managed current assets are more capable of maintaining stable liquidity, even under economic fluctuations [15, 16]. At the same time, research shows that if current assets are not managed effectively, they can lead to financial difficulties, especially during seasonal fluctuations in agricultural sector cash flows [8].

Research indicates that good management of the ratio between current assets and current liabilities can significantly improve the financial flexibility of agricultural holdings. The optimal ratio between these elements leads to better management of short-term liquidity needs, thus reducing dependence on external financing. Studies on agricultural holdings in Turkey show that managing the ratio between long-term assets and current liabilities can improve farm liquidity [1].

Macroeconomic conditions have a significant impact on the asset structure of agricultural holdings. Factors such as inflation, economic growth, and government spending directly affect enterprises' ability to invest in fixed or current assets. Research in this context shows that macroeconomic factors play a crucial role in forming the capital structure in agriculture and consequently influence asset allocation [22]. Access to credits and subsidies is another key external factor affecting asset structure. Research in Hungary shows that the size of subsidies can reduce the need for using loans to finance current and fixed assets. This, in turn, increases farmers' ability to maintain liquidity and stability by reducing their dependence on external financing sources [14]. Market conditions also play an important role in decision-making regarding investments in fixed and current assets. A study of agricultural enterprises in the Czech Republic and Slovakia shows that market dynamics, such as raw material prices and market competition, influence these enterprises' financial structure and their asset allocation decisions [13].

Subsidies play a key role in maintaining the financial sustainability and profitability of agricultural holdings. The capitalisation of subsidies – a process where subsidies influence rental rates, land prices, and farm asset values – can have significant economic consequences for farmers. According to research conducted in the European Union, subsidies lead to increased rents and land prices, which in turn reduces farm competitiveness [11]. The impact of direct subsidies on farm budgets and fixed asset investments is well documented. Research shows that direct subsidies represent a significant portion of farm income and have a positive impact on the level of fixed asset investments. For example, in a study conducted in Poland, subsidies constitute about one-third of farm profits, supporting their fixed asset investments and improving long-term farm sustainability [24]. Dynamic analysis of the relationship between subsidies and farm efficiency shows that subsidies often have complex effects on farms' technical efficiency. A study in France finds that while subsidies are associated with decreased technical efficiency, the relationship is weak and highly dependent on the specifics of farming activities and management models used [18].

Contemporary trends in agricultural asset management are strongly influenced by technological innovations and global climate challenges. Technologies such as Agriculture 4.0 and the use of IoT, robotics, and artificial intelligence significantly change how assets are managed, with a focus on sustainability and efficiency of agricultural holdings. This is seen as a critical step towards addressing growing global food needs and reducing the environmental footprint of production systems [2]. Liquidity management and optimisation of asset ratios in agricultural holdings remains a challenge. Unpredictable climate changes and market instability create additional difficulties in maintaining an adequate balance between current and fixed assets. Financing opportunities through innovative financial instruments such as investment

funds and sustainability bonds remain underutilised in the agricultural sector, limiting farmers' access to liquidity [6]. Innovations related to sustainable asset management include the integration of digital technologies and smart management systems, leading to better resource utilisation. For example, the use of AgTech solutions and innovations in mechanisation, micro-irrigation, and logistics are important for improving farm productivity and minimising costs and losses in the production process [7].

The present study contributes to existing literature by providing an in-depth analysis of asset structure and dynamics in Bulgarian agricultural holdings, as well as their influence on key financial indicators such as liquidity and indebtedness. Unlike previous studies, which often focus on individual aspects of financial management in agriculture, this research offers an integrated approach, combining asset analysis with an assessment of their impact on financial stability. A particularly important aspect of this study is that the analysis is conducted by economic size of agricultural holdings, allowing for the identification of specific challenges and strategies characteristic of different-scale farms. Furthermore, the study examines the impact of subsidies on asset structure, which is particularly relevant in the context of the EU's Common Agricultural Policy.

MATERIALS AND METHODS

The study uses data from the Farm Accountancy Data Network (FADN) [9] of the Ministry of Agriculture, Food and Forestry of Bulgaria for the period 2014-2020 to analyse the asset structure of agricultural holdings and their influence on financial indicators. The data covers financial statements of farms from six different economic categories, classified according to their total standard output – from below 8 thousand euros to above 500 thousand euros.

The analysis focuses on the structure and dynamics of fixed and current assets of agricultural holdings. Through comparison of these assets across different economic categories and through different years, understanding is sought for the investment strategies and capital structure of the farms. This way, it is examined how farms of different economic sizes allocate their assets and what trends are observed over time.

Following the analysis of asset structure, a correlation analysis is conducted to examine the relationships between fixed and current assets and the following financial indicators: current ratio and debt ratio. The current ratio is used to measure farms' ability to cover their short-term liabilities through current assets. The debt ratio assesses the share of borrowed funds in the overall financing structure, which allows evaluation of the financial risk for each farm. The correlation analysis aims to establish how assets affect the financial condition of farms. At the same time, the role of subsidies as a potential source of asset financing in different farm categories is analysed.

This combination of structural asset analysis and correlation analysis provides a comprehensive understanding of how assets influence the financial stability of farms, as well as the role of subsidies in their development.

RESULTS AND DISCUSSIONS

Structure and Dynamics of Agricultural Holdings' Assets

The analysis of fixed and current assets structure across different categories of farm holdings over the years reveals key trends related to their investment decisions and capital structure (Figure 1). Firstly, it is evident that holdings with larger economic size, especially those in the "over 500 thousand euros" category, have significantly higher both fixed and current assets compared to smaller holdings. This is expected, as large farms have more resources, allowing them to make large-scale investments in equipment, buildings, and land. These fixed assets play a key role in the sustainability and long-term productivity of agricultural holdings.

One of the main findings from the analysis is that fixed assets significantly dominate over current assets across all farm categories and

throughout all years considered. This shows that agricultural holdings primarily orient themselves towards long-term investments that guarantee production sustainability in the long term. Fixed assets such as machinery and agricultural infrastructure are essential for their operation, which is reflected in the stable ratio of these assets to current assets over time.

Furthermore, there are no significant fluctuations in fixed asset values across different years. This suggests that farm holdings maintain relatively stable levels of fixed assets, and no drastic changes in their investment strategies are observed over the years. On the other hand, current assets remain at significantly lower levels, especially in smaller holdings. This may be due to limited financial resources of small farms, which force them to rely on lower liquidity and current assets for operational needs.

In smaller holdings, such as those with turnover up to 8 thousand euros, the lowest values of both fixed and current assets are observed. This is a clear indicator of their limited capitalisation and the fact that they rely on minimal resources for their operation. At the same time, holdings from higher-income categories, such as those in the range between 50 and 500 thousand euros, show balanced distribution of current and fixed assets, which allows them to maintain greater liquidity and operational flexibility.

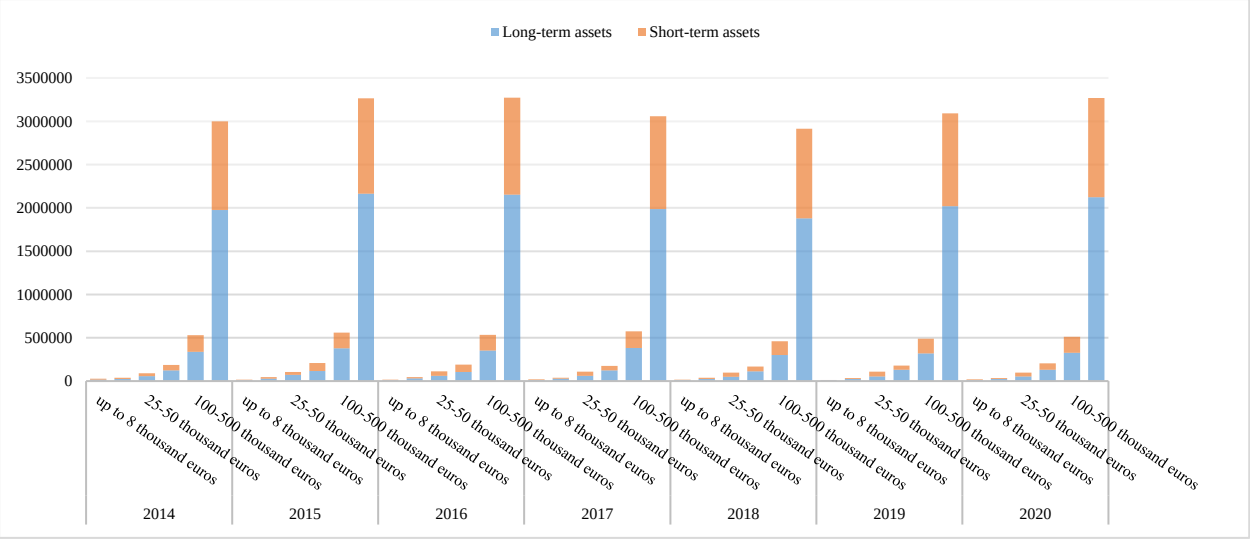

Fig. 1. Distribution of Long-term and Short-term Assets by Farm Categories from 2014 to 2020
Source: Own calculations based on FADN [9].

Analysis of Asset Influence on Liquidity

The results of the correlation analysis between assets and the total liquidity of agricultural holdings reveal significant differences depending on the economic size of the holdings, which suggests a more in-depth examination of financial strategies and asset management in each category (Table 1).

For the smallest holdings ("up to 8 thousand euros"), the negative correlation (-0.6037) between long-term assets and liquidity indicates that investments in long-term assets significantly worsen the liquidity of these holdings. This may be due to the fact that smaller holdings often have limited capital directed towards assets with a longer return period, such as agricultural machinery and equipment, which reduces their ability to maintain liquid funds to cover current liabilities. Interestingly, current assets show an almost neutral relationship with liquidity (0.0688), which means that current assets, although present, do not substantially impact these holdings' ability to cover their short-term obligations.

In the next category, "8-25 thousand euros", a negative correlation between long-term assets and liquidity (-0.3877) is also observed, but it is weaker compared to the smallest holdings. This suggests that larger holdings in this category can manage their long-term assets slightly better, but still face challenges in

maintaining high liquidity. The stronger positive relationship between current assets and liquidity (0.1477) indicates that these assets begin to play a more significant role in liquidity, but are still not a decisive factor.

The "25-50 thousand euros" category shows the strongest negative correlation between long-term assets and liquidity (-0.6842). Here, it is evident that the increase in long-term assets significantly undermines the liquidity of the holdings. This can be explained by the fact that these holdings are likely increasing investments in long-term assets such as machinery, buildings, and land, which ties up significant capital in illiquid resources. At the same time, current assets show a stronger positive correlation (0.538), which means that these holdings depend more on current assets to maintain their short-term financial stability.

For holdings in the "50-100 thousand euros" category, a significantly weaker negative correlation between long-term assets and liquidity (-0.2792) is observed, which suggests that these holdings are able to maintain better financial flexibility despite the increase in long-term assets. This may be due to the fact that these holdings have reached a point of balance where increasing long-term assets does not lead to a sharp deterioration in liquidity. The extremely strong positive correlation between current assets and liquidity (0.929) shows that these holdings rely primarily on current assets to maintain their liquidity. This result highlights the importance of current assets as the primary mechanism for managing liquidity in this category of holdings.

For larger holdings in the "100-500 thousand euros" category, the negative correlation between long-term assets and liquidity is almost non-existent (-0.0128), which shows that these holdings manage to maintain good liquidity, regardless of increasing long-term assets. This suggests that these holdings have more stable financial structures that allow them to invest in long-term assets without compromising their short-term solvency. At the same time, the moderate positive correlation between current assets and liquidity (0.5878) indicates that current assets continue to play an important role in maintaining the financial stability of these holdings.

For the largest holdings, in the "over 500 thousand euros" category, both long-term (-0.3364) and current assets (-0.3757) show a negative correlation with liquidity. This is surprising, as larger holdings were expected to maintain more stable liquidity. This is likely due to the fact that large holdings tend to use more long-term liabilities and credits to finance their operations and investments, which creates pressure on liquidity. Additionally, despite having larger current assets, these holdings probably have significant current liabilities that affect their liquidity.

In summary, the results highlight that small holdings are more dependent on current assets to maintain liquidity, while larger holdings require a better balance between long-term and current assets. Although large holdings have a more stable financial foundation, their complex financial structures associated with long-term liabilities can create pressure on liquidity. These differences underscore the need for differentiated asset management strategies depending on the economic size of the holding.

Table 1. Correlation between Long-Term and Short-Term Assets and Liquidity in Farms by Economic Size

Farmers by economic size	Correlation between long-term assets and liquidity	Correlation between short-term assets and liquidity
up to 8 thousand euros	-0.6037	0.0688
8-25 thousand euros	-0.3877	0.1477
25-50 thousand euros	-0.6842	0.5380
50-100 thousand euros	-0.2792	0.9290
100-500 thousand euros	-0.0128	0.5878
over 500 thousand euros	-0.3364	-0.3757

Source: Own calculations based on FADN [9].

Analysis of Asset Influence on Indebtedness

The analysis of the correlation between long-term and current assets and the debt ratio across different economic farm categories reveals important dependencies in financing structure (Table 2).

Table 2. Correlation between Long-Term and Short-Term Assets and Debt Ratio in Farms by Economic Size

Farmers by economic size	Correlation between long-term assets and debt ratio	Correlation between short-term assets and debt ratio
up to 8 thousand euros	0.8919	0.5550
8-25 thousand euros	0.6804	0.2625
25-50 thousand euros	0.8474	-0.2811
50-100 thousand euros	0.4503	-0.4925
100-500 thousand euros	-0.3214	-0.0421
over 500 thousand euros	0.3949	0.7000

Source: Own calculations based on FADN [9].

For the smallest farms (with an economic size up to 8 thousand euros), the correlation between long-term assets and indebtedness is strongly positive (0.8919), which shows that these farms rely significantly on external financing for acquiring long-term assets. The high correlation between current assets and indebtedness (0.555) also indicates that these farms likely use external funds not only for long-term but also for current assets, such as working capital and inventories.

Farms with an economic size between 50 and 100 thousand euros demonstrate a decreasing dependency between long-term assets and indebtedness (0.4503), while the correlation between current assets and indebtedness becomes strongly negative (-0.4925). This suggests better management of current assets and possibly reducing dependence on external financing for short-term needs.

For farms with an economic size between 100 and 500 thousand euros, an interesting trend is observed – the correlation between long-term assets and indebtedness is negative (-0.3214), which suggests that these farms manage to finance their long-term assets with internal resources or use other financial mechanisms that reduce their indebtedness. The correlation between current assets and indebtedness is almost zero (-0.0421), which suggests that current assets do not significantly impact the indebtedness of these farms.

The largest farms, with an economic size over 500 thousand euros, demonstrate a moderate positive correlation both between long-term assets and indebtedness (0.3949) and between current assets and indebtedness (0.7). This may mean that these farms use a balanced approach to financing their assets, relying on both internal and external funds to cover their needs for long-term and current assets.

In conclusion, the analysis reveals that small and medium farms are more dependent on external financing for acquiring long-term assets, while larger farms show a better ability for self-financing. These results highlight the importance of access to financial resources for small and medium farmers, while simultaneously emphasising the more sustainable financial structure of large holdings.

Analysis of Subsidy Influence on Assets

The correlation coefficients in the table reflect the relationship between long-term and current assets and subsidies for farmers with different economic sizes (Table 3). The findings from this correlation emphasise the varying role of subsidies as a financing source for different types of assets depending on the holding size.

For farmers with small holdings, with assets up to 8 thousand euros, we observe a moderate positive correlation between long-term assets and subsidies (0.3738) and a weak negative correlation between current assets and subsidies (-0.0509). This result suggests that subsidies in small holdings are likely used primarily for financing long-term assets, such as machinery, facilities, and infrastructure. At the same time, current assets have no significant connection with subsidies, which implies that liquidity and working assets in these holdings are less dependent on

government and European financial programmes.

Table 3. Correlation between Long-Term and Short-Term Assets and Subsidies in Farms by Economic Size

Farmers by economic size	Correlation between long-term assets and subsidies	Correlation between short-term assets and subsidies
up to 8 thousand euros	0.3738	-0.0509
8-25 thousand euros	0.3679	-0.486
25-50 thousand euros	0.0727	0.504
50-100 thousand euros	0.2302	0.498
100-500 thousand euros	0.7554	0.5938
over 500 thousand euros	0.0688	-0.3905

Source: Own calculations based on FADN [9].

For farmers with assets between 8 and 25 thousand euros, we again observe a positive correlation between long-term assets and subsidies (0.3679), which means that subsidies continue to be an important source of financing for capital investments in these holdings. However, the strongly negative correlation with current assets (-0.486) suggests that subsidies are not actively used for financing liquid assets such as inventories and cash. This may be due to the limited application of subsidies for working needs and the fact that smaller holdings are more inclined to invest in long-term assets.

An interesting pattern is observed for farmers with assets between 25 and 50 thousand euros, where there is a very weak positive correlation between long-term assets and subsidies (0.0727), but a significantly positive correlation between current assets and subsidies (0.504). This result shows that in these holdings, subsidies are directed towards supporting short-term liquidity and working capital. In this way, subsidies support current assets such as inventories and working funds, which can be crucial for the sustainable functioning of the holdings.

Farmers in the 50-100 thousand euros category also show positive correlations for both asset types: a moderate positive correlation for long-term assets (0.2302) and a significant positive correlation for current assets (0.498). This pattern confirms that subsidies in this category of holdings play a balanced role for both capital investments and farmers' operational needs. Thus, these subsidies provide support both for farm modernisation through long-term assets and for maintaining the necessary working capital for daily operations.

For farmers with assets from 100 to 500 thousand euros, we observe the strongest positive correlation between long-term assets and subsidies (0.7554), as well as a significant correlation with current assets (0.5938). This result clearly shows that in larger holdings, subsidies play a critical role in financing assets, supporting both investments in long-term assets and the liquidity of the holdings. This corresponds to the larger-scale investments that big holdings typically make in machinery, facilities, and modernisation, which are a primary source of competitiveness.

For the largest farmers with assets over 500 thousand euros, the correlation between long-term assets and subsidies is weak (0.0688), while the correlation with current assets is negative (-0.3905). This means that these farms likely rely less on subsidies for financing their current assets, such as inventories, short-term receivables, and cash. Instead, they can rely on internal financial resources or other forms of financing to cover their short-term needs. In these cases, subsidies are likely directed towards specific capital investments, while the holdings themselves rely on internal financing for working assets and operational expenses.

Based on the analysis of the correlation between assets and subsidies, it can be concluded that subsidies play different roles depending on the size of the holdings. Small and medium farmers use subsidies primarily for financing long-term assets, while for larger holdings, subsidies support both capital investments and short-term liquidity. However, for the largest holdings, subsidies

are less connected with current assets, which suggests that these holdings have stronger alternative sources for financing liquidity.

CONCLUSIONS

Based on the conducted analysis, the following main conclusions can be drawn:
-*Predominance of long-term assets:* Long-term assets significantly dominate current assets across all farm categories, showing a focus on long-term investments and sustainable development. Farms with a larger economic size have more resources for investing in machinery, equipment, and infrastructure.
-*Role of economic size:* Large holdings ("over 500 thousand euros") show significantly larger assets compared to smaller ones, which provides advantages in investment decisions and the ability to maintain better liquidity.
-*Negative correlation between long-term assets and liquidity*: For small holdings, long-term assets worsen liquidity, demonstrating difficulties in managing short-term obligations. The strongest negative correlation is observed in holdings in the "25-50 thousand euros" category, indicating that as long-term assets increase, they become increasingly illiquid.
-*Role of current assets in liquidity*: Current assets play a crucial role in the liquidity of holdings, especially for those of medium and large size. The strongest positive correlation between current assets and liquidity is observed in holdings in the "50-100 thousand euros" category, highlighting their dependence on current assets for maintaining financial stability.
-*Differences in external financing dependency*: Small and medium holdings rely significantly on external financing for acquiring long-term assets, with a strongly positive correlation between long-term assets and indebtedness. Large holdings show greater financial independence and self-financing ability.
-*Varied role of subsidies:* Subsidies play an important role in asset financing, but their role differs depending on the holding's size. Small and medium holdings rely on subsidies primarily for financing long-term assets, while for larger holdings, subsidies support both capital investments and short-term liquidity.
-*Greater financial flexibility of large holdings:* Large holdings demonstrate an ability to maintain good liquidity despite increasing long-term assets. They rely on a balanced approach between long-term and short-term assets for liquidity management.
-*Need for differentiated strategies:* The findings underscore the need for differentiated asset management strategies depending on the economic size of holdings. Small holdings must focus on improving liquidity through efficient management of current assets and limiting external financing for long-term assets.
These conclusions show the different financial strategies and challenges faced by agricultural holdings, depending on their size and asset structure. They also highlight the significance of well-balanced asset management for maintaining liquidity and sustainability of agricultural holdings.

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