

Received: 2022-11-05
Accepted: 2023-01-12
Online published: 2023-02-28
DOI: <https://doi.org/10.15414/meraa.2022.08.02.66-73>



Original Paper

Alternatives to the measurement of inventories of the same type within their outflows in agricultural companies

Iveta Košovská*

Slovak University of Agriculture, Faculty of Economics and Management, Institute of Accounting and Informatics, Nitra, Slovak Republic

ABSTRACT

The measurement of assets and liabilities as at the measurement date is crucial in each accounting entity not excluding agricultural entities. The most essential legal norm in the Slovak Republic focusing on the measurement is the Act No. 431/2002 Coll. on Accounting. The main task of article is to determine the alternative of measurement of inventories of the same type when they are removed from agricultural companies. With the above calculations we would like to present the possibilities of using quantitative methods in the accounting of agricultural companies. The entity can select any measurement method which should be specified in its internal policies and cannot be changed during the accounting period. It should select a method that shows consumption of inventories of the same type as faithfully as possible. It can be concluded that the WAA inventory shrinkage method allows the value of an entity's inventories to be expressed at relatively current prices. It is simple and is often used by entities that hold large quantities of different inventories.

KEYWORDS: accounting, measurement, assets, inventories, weighted arithmetic average

JEL CLASSIFICATION: Q14, M40, M41

INTRODUCTION

The specific conditions of the agricultural primary production business in comparison with other businesses have a concrete economic impact on their assets. Act No 431/2002 Coll. on Accounting, as amended [15] defines assets as those assets of an entity which are the result of past events, are almost certain to increase the entity's economic benefits in the future and can be measured reliably in accordance with Sections 24 to 28; they are recognized in the financial statements in the balance sheet or in the statement of assets and liabilities.

* Corresponding author: Iveta Košovská, Slovak University of Agriculture, Faculty of Economics and Management, Institute of Accounting and Informatics, Tr. A. Hlinku 2, 949 76 Nitra, Slovak Republic
E-mail: iveta.kosovska@uniag.sk

The amount and structure of the company's assets depend on the type and scope of the company's economic activities, the course of which must be accurately and reliably recorded in the accounting [9]. The basic criterion for the division of all recorded property items in the balance sheet is the aspect of the participation of assets in the transformation process, based on which assets are divided into non-current and current assets [7]. Current assets are defined by [14] as assets whose period of use in the enterprise is less than one year. Current assets rotate and change their form in the process of production back into monetary form. In the production process, current assets are consumed once, and their value enters into manufactured products. The structure of current assets writes [10] is made up of inventories, current receivables, and financial assets.

Specific conditions of business in agricultural primary production in comparison with other business entities have a concrete economic impact on their assets. The assets of agricultural companies have their own significance and way of use. Accounting must capture the specific nature of the agricultural activity, which affects in particular the possible measurement options and the classification of assets, but also the quantification of the economic result. The classification and valuation of animals and plants used in agricultural production is based on the benefits that these assets bring [4]. The measurement of assets is one of the very important areas of financial accounting. We can only account for and report in the financial statements those items that can be valued [6]. The essence of valuation is the choice of the valuation variable to be used for valuation. The testability of all economic information recorded in the accounts and reported in the financial statements depends on the selected valuation technique [13]. A valuation variable refers to a specific type of monetary amount that is used in the process of measuring an asset [1].

At the date of the accounting event, depending on the method of acquisition, an entity may measure each type of inventory using the following valuation variables:

- acquisition cost,
- own costs,
- air value [2].

Stored stocks of the same kind may be measured at the time of removal under current accounting legislation:

- individually,
- at the price determined by a weighted arithmetic average,
- in a manner where the first price used to measure the addition to inventory is used as the first price used to value the drawdown of inventory (FIFO - First In First Out) [12].

MATERIAL AND METHODS

The agricultural sector is an important part of an economy and has its own specifics [11]. The measurement of assets and liabilities plays an important role in any entity, including primary agricultural enterprises. Efforts to find an appropriate measurement approach in accounting have long been observed both nationally and internationally. Measurement is important in accounting for individual changes in assets and liabilities during the accounting period, as well as in reporting the position of assets, liabilities, and equity and in determining profit or loss.

The main task of article is to determine the alternative of measurement of inventories of the same type when they are removed from agricultural companies. The methods of financial mathematics can be applied in many economic sectors, for example accounting, financial

planning, and decision-making [5]. With the above calculations we would like to present the possibilities of using quantitative methods in the accounting of agricultural companies, these are model examples.

The weighted arithmetic average shall be determined from the actual acquisition cost of the same type of inventory. The price so determined shall be the price at which the inventories are measured when they are released for consumption. It may be quantified:

- (a) periodically and at least monthly; or
- (b) continuously, i.e., at each increment of inventories (referred to as the rolling or moving weighted arithmetic average).

General formula for determining the weighted arithmetic average (WAA):

$$\bar{x} = \frac{\sum_{i=1}^p x_i n_i}{\sum_{i=1}^p n_i},$$

where: x is the price of the unit in kind in € (i.e., the price of 1 kg, 1 piece, 1 m, etc.),
 n - quantity in units of kind,
 p - number of movements in the period.

Weighted arithmetic average periodic

The weighted arithmetic average is calculated from actual purchase prices over a specified period (a month or less). The average cost thus determined is used to measure inventories when they are put to consumption until the next average cost is determined (e.g., for the next month). In practice, this may be done as follows:

- accounting of inventories is processed in batches, i.e., the inventory depletion is recorded in the analytical records in kind units during the month. It is only booked in euro after the end of the month with the date of the last day of the month. In this case, the weighted arithmetic average calculated for the month is also used to book the consumption of stocks for the same month,
- accounting for inventories is done on a continuous basis, i.e., daily accounting is made for stock outflows, e.g., of materials (if there is an outflow on that day). In this case, the weighted arithmetic average calculated for the month is used to measure consumption in the following month. At the end of the month, the actual consumption is adjusted in relation to the next newly calculated weighted arithmetic average.

$$WAA_{\text{period.}} = \frac{\begin{array}{l} \text{inventories on hand} \\ \text{at the beginning of the period in €} \end{array} + \begin{array}{l} \text{inventories increments} \\ \text{for a month in €} \end{array}}{\begin{array}{l} \text{inventories on hand in units at} \\ \text{the beginning of the period} \end{array} + \begin{array}{l} \text{inventories increments for} \\ \text{a months in units} \end{array}}$$

Weighted arithmetic average continuous

When using the weighted arithmetic average continuous, the procedure is that a new weighted arithmetic mean is calculated after each new increment of a certain type of stock. The average acquisition cost thus obtained (calculated from the actual acquisition cost) is used to measure the inventories on hand and, when released for consumption, until the next increment of stock.

$$WAA_{\text{cont.}} = \frac{\text{inventories on hand in €} + \text{last inventories increment in €}}{\text{inventories on hand in units} + \text{last inventories increment in units}}$$

Information from professional literature and available electronic resources consisting of various magazines and scientific publications from the databases Web of Science, Scopus and other data from the websites were used as the source for the processing of the article. The basic methodical approach of processing is presented by standard methods of scientific work such as selection, analysis, comparison, deduction, and synthesis in a theoretical as well as in a practical level.

RESULTS AND DISCUSSION

In most entities, inventories are a significant component of current assets. They are intended for short-term use (one year or less). The form and type of inventories depend on the nature of the entity's business (production, trading, or services). Inventories may be classified in terms of the method of acquisition as follows:

1. acquired from an external environment, mainly by purchase:
 - material,
 - goods,
2. stocks of own production:
 - work in progress,
 - semi-finished goods,
 - products,
 - animals.

The procedure for measurement of inventories is mandatorily laid down in the fifth part of the Accounting Act (Sections 24 to 28) and by the Ministry of Finance Regulation No 23054/2002-92 of 16 December 2002, in particular Sections 22 to 24 and 18, which lays down details of accounting procedures and the framework chart of accounts for entrepreneurs accounted for in the double-entry book-keeping system, as amended.

An entity shall follow generally accepted accounting principles, assumptions, and principles in the measurement of inventories, which shall also be followed in accounting. The measurement of inventories shall be consistent with the requirement of a true and fair view. The measurement of inventories must also comply with the principle of permanence of measurement methods. This means that the entity shall determine in its internal regulations the method of measurement of each type of inventory and apply it in each accounting period. The traditional accounting principles applied in the measurement of inventories include the principle of measurement at historical cost, which refers to the period when the inventories were purchased, internally generated, or otherwise acquired. All types of inventories are measured at historical cost when they are acquired and first recognized in the accounts. In accordance with the Accounting Act, inventories are valued as follows:

- inventories that enter into the entity's accounts are measured at the date of the event on the basis of reliable information available to the entity,
- at the date at which the financial statements are prepared.

Inventories acquired by purchase are measured at acquisition cost (AC). It is the price at which the asset was acquired (purchase price of materials, goods, animals), the costs associated with its acquisition (e.g., freight, duty, insurance, related commissions, costs of processing the material before it is released for consumption, packing) and any reductions in that cost. As regards the entity's intercompany services related to the acquisition of purchased inventories and the processing of inventories, the entity shall capitalise only the freight and the entity's own costs of processing the material. The cost of inventories includes freight only after first receipt in stock. Other intra-entity transfers of inventories directly affect the economic result and are accounted for in accounting class 5 - Costs.

Own-produced inventories, animal additions are valued at own cost (OC), which is the direct cost incurred in production or other activity and, where applicable, the portion of indirect costs that relates to production or other activity. Financial costs related to the use of external resources (e.g., interest) may be included in own costs only if they belong to the period of inventory creation.

At the date of the accounting event, which is the date of the inventory write-down, the entity shall measure the inventory write-down as follows:

- individual measurement - the measurement at which the inventories were valued when they were acquired shall be used,
- inventories of the same type may be accounted for by the entity at the stock valuation:
 - a) weighted arithmetic average - calculated from the cost or cost price of the same type of inventory at least monthly or more frequently at the entity's discretion.
 - b) the first-in, first-out (FIFO) method, which consists of using the first price to measure the addition to the corresponding same type of inventory as the first price to measure the depletion of that inventory.

Measurement by weighted arithmetic average periodic - in batch accounting processing at the end of the month

As at 1st March 2022 an accounting entity XY Ltd. has on account 112 - Material in stock the amount of 90 €. According to the warehouse records, 100 kg of plain flour was in stock on 1 March, measured at the purchase price of 0.90 € per kg. The following movements occurred in March:

Table 1 Batch accounting processing at the end of the month

Date	Text	Increments			Outflows			Balance		
		kg	€/kg	€	kg	€/kg	€	kg	€/kg	€
1.3	Opening balance							100	0.90	90
5.3	Store receipt voucher	20	0.95	19				120		
16.3	Material issue slip				15			105		
20.3	Store receipt voucher	30	0.90	27				135		
21.3	Store receipt voucher	15	0.92	13.8				150		
25.3	Material issue slip				20			130		
26.3	Material issue slip				25			105		
28.3	Store receipt voucher	25	0.98	24.5				130		
30.3	Material issue slip				15			115		
31.3	Consumption				75	0.92	69			
31.3	Closing balance							115	0.92	105.8

It is clear from the data in the table that each purchase of material (flour) was made at a different unit price.

$$WAA_{\text{per.}} = \frac{(0.90 \cdot 100) + (0.95 \cdot 20) + (0.90 \cdot 30) + (0.92 \cdot 15) + (0.98 \cdot 25)}{100 + 20 + 30 + 15 + 25,190} = 0.92 \text{ €}$$

Average price of 1 kg flour acquired in March was 0.92 €

The consumption of flour in kg = 75 kg

The consumption of flour in € for March = 75 kg x 0.92 € = 69 €

As at 31 March flour measurement on stock is calculated so, that the balance in kg is measured at the average price.

Balance in kg: 100 + 90 – 75 = 115 kg

Balance measurement: 115 kg x 0.92 € = 105.8 €

Measurement by weighted arithmetic average periodic - in the case of continuous processing of inventory accounting

For the measurement of flour consumption during the month of March, we used the average price of 1 kg of flour calculated at the end of February: € 0.90 per kg of flour.

As of 31st March, the valuation of flour in stock is: € 0.90, so we will calculate the consumption as follows:

The consumption of flour as at 16 March is measured at this price 15 kg x 0.90 = 13.5 €

The consumption of flour as at 25 March will also be measured at this price 20 x 0.90 = 18 €

The consumption of flour as at 26 March will be measured at 25 kg x 0.90 = 22.5 €

The consumption of flour as at 30 March will be measured at 15 kg x 0.90 = 13.5 €

Total flour consumption in the month of March, valued at the weighted arithmetic average for the month of February, will be: 13.50 + 18 + 22.50 + 13.50 = 67.50 €

A new weighted arithmetic periodic average must be calculated as at March, and this will be used to value the flour consumption in April.

Table 2 Continuous processing of inventory accounting

Date	Text	Increments			Outflows			Balance		
		kg	€/kg	€	kg	€/kg	€	kg	€/kg	€
1.3	Opening balance							100	0.90	90
5.3	Store receipt voucher	20	0.95	19				120		
16.3	Material issue slip				15	0.90	13.5	105		
20.3	Store receipt voucher	30	0.90	27				135		
21.3	Store receipt voucher	15	0.92	13.8				150		
25.3	Material issue slip				20	0.90	18	130		
26.3	Material issue slip				25	0.90	22.5	105		
28.3	Store receipt voucher	25	0.98	24.5				130		
30.3	Material issue slip				15	0.90	13.5	115		
31.3	Total	90		84.3	75		67.5			106.8
31.3	Price difference									1

Table 3 Measurement by weighted arithmetic average continuous

Date	Text	Increments			Outflows			Balance		
		kg	€/kg	€	kg	€/kg	€	kg	€/kg	€
1.3	Opening balance							100	0.90	90
5.3	Store receipt voucher	20	0.95	19				120	0.91	109.2
16.3	Material issue slip				15	0.91	13.65	105	0.91	95.55
20.3	Store receipt voucher	30	0.90	27				135	0.91	122.85
21.3	Store receipt voucher	15	0.92	13.8				150	0.91	136.65
25.3	Material issue slip				20			130	0.911	118.43
26.3	Material issue slip				25			105	0.911	95.655
28.3	Store receipt voucher	25	0.98	24.5				130	0.92	119.6
30.3	Material issue slip				15			115	0.92	105.8
31.3	Closing balance							115	0.92	105.8

Date

$$03/05/2021 \quad WAA_{cont.} = \frac{90 + 19}{120} = 0.91 \text{ €}$$

Date

$$03/20/2021 \quad WAA_{cont.} = \frac{95.55 + 27}{135} = 0.91 \text{ €}$$

Date

$$03/21/2021 \quad WAA_{cont.} = \frac{122.85 + 13.8}{150} = 0.911 \text{ €}$$

Date

$$03/20/2021 \quad WAA_{cont.} = \frac{95.655 + 24.5}{130} = 0.92 \text{ €}$$

Assuming that an entity uses the WAA (weighted average) method, the cost for example of goods sold is often higher than using the FIFO method, and this occurs in situations where recent purchases of inventories have been made at higher unit prices than in the past. It can be concluded that the WAA inventory shrinkage method allows the value of an entity's inventories to be expressed at relatively current prices. It is simple and is often used by entities that hold large quantities of different inventories.

CONCLUSIONS

The measurement of inventories in the Slovak Republic is linked to the Accounting Act. In many cases, accounting entities do not address the issue of measurement of individual types of inventories but follow the measurement method that best suits them or is established in the accounting records of the enterprise.

The aim of this articles was to present alternatives for inventory measurement of the same type in the process of their outflows. Using an illustrated example, we explain a possible way of measuring the same type of inventories by using a weighted arithmetic average. We have

attempted to show the variety of approaches to measuring the same type of stock on removal. Based on the examples given, the entity can decide, and the most appropriate alternative can be chosen, and other approaches can be derived. The entity can select any measurement method which should be specified in its internal policies and cannot be changed during the accounting period. It should select a method that shows consumption of inventories of the same type as faithfully as possible. It is common for the price of one type of material to go down or up during the year depending on market prices or suppliers. This creates complications when removing stock from the warehouse and raises the question: At what price to remove such material?

ACKNOWLEDGEMENTS

This paper is an output of the science project VEGA no. 1/0429/22 with the title *The assessment of property valuation impacts on the financial health of agricultural enterprises in the Slovak Republic*.

REFERENCES

- [1] Baculíková, N., & Križo, P. (2021). *Business Economy – selected chapters*. Bratislava: Wolters Kluwer SR s. r. o. 140 p. (in Slovak).
- [2] Bednárová, B., & Šlosárová, A. (2015) Analysis of measurement approaches in financial statements of selected industrial enterprises in the Slovak republic from perspective of users usefulness. *10th International Scientific Conference: Financial Management of Firms and Financial Institutions*. Ostrava, Czech Republic, pp. 1263-1273.
- [3] Cenigová, A. (2022). *Double-entry bookkeeping of entrepreneurs*. Bratislava: Ceniga, s.r.o. 2022. 656 p. (in Slovak).
- [4] Dvořáková, D. (2017). *Specifics of accounting and assessing in the agriculture sector*. Praha: Wolters Kluwer. 148 p. (in Czech).
- [5] Hornýák Gregáňová, R. (2017). Financial and insurance mathematics in the context of economic and managerial university education. *ICERI 2017 - proceedings from conference ICERI 2017*. Valencia: IATED, 7450-7455.
- [6] Juhászová, Z. et al. (2022). *Accounting*. Bratislava: Wolters Kluwer. 276 p. (in Slovak).
- [7] Kajanová, J., & Saxunová, D. (2022). *Basics of Accounting*. Bratislava: Wolters Kluwer. 148 p. (in Slovak).
- [8] Látečková, A., Košovská, I., & Škorecová, E. (2020). *Accounting for Entrepreneurs*. Nitra: Slovak University of Agriculture in Nitra. 281 p. (in Slovak).
- [9] Majduchová, H. et. al. (2020). *Business Economy*. Bratislava: Wolters Kluwer SR s. r. o. 424 p. (in Slovak).
- [10] Rúčková, P. (2015). *Financial Analysis*. Praha: Grada Publishing, a.s. 250 p. (in Czech).
- [11] Steklá, J., Gryčová, M., & Homolka, J. (2015). Evaluation of capital structure of agricultural cooperatives. *AGRIS on-line - Papers in Economics and Informatics*, 7 (3), 37-48. DOI 10.7160/aol.2015.070304
- [12] Strouhal, J. (2022). *Accounting correlations of business entities*. Praha: Wolters Kluwer. 276 p (in Czech).
- [13] Šlosárová, A. et al. (2016). *Accounting*. Bratislava: Wolters Kluwer. 296 p. (in Slovak).
- [14] Šteker, K. (2020). *Financial Accounting*. Praha: VŠEM. 150 p. (in Czech).
- [15] *The Act No. 431/2002 Coll. on Accounting as amended*.