

STOCK MANAGEMENT IN FARMS CHARACTERISED BY DIVERSIFIED PRODUCTION AREA

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Abstract. The paper presents the level, structure and costs of stock gathering and keeping in farms depending on production area size and reasons for keeping stock in the opinion of polled farmers. Average stock level in the examined farms was $14.9 \text{ t}\cdot\text{ha}^{-1}$, and was growing along with the increasing production area. High stock level is reflected in its keeping and gathering costs, which ranged between 49 and $155.2 \text{ PLN}\cdot\text{t}^{-1}$ of stored goods. The main reason for keeping stock in the examined objects was to ensure protection against consequences of natural disasters, and to reduce stock-out risk.

Key words: stock, management, costs, goods, opinion

Stating and justifying a scientific problem

Stock management in farms is a true challenge and usually involves selecting a specific strategy from the whole range of possible solutions. According to Wasilewski [2004], stock constitutes unused material goods kept by a company for the future use. In a production enterprise where stock belongs to the main items of working assets, stock may occur in three areas of activity [Gołemska 1999]: in supply - as reserves of raw materials, materials and semi-finished products; in production - as reserves of production in progress; and in distribution - as reserves of finished products. Stock constitutes one of the basic items in enterprise working assets. First of all, the need to keep stock is connected with ensuring continuity of production processes and sales, protection against price changes, and maintaining own produce quality [Kowalski, Tabor 2003]. Stock management is not only logistics. It also has a financial aspect - excessive money freezing in stock generates lost potential costs, which restrict farm development.

Keeping stock at a specific quantitative and qualitative level forces farmers into providing suitable warehouse infrastructure including warehouse buildings and structures. Number and type of warehouses should be dependent on a production profile and transport organisation (supply and sale), while all operations related to stock management should be oriented to minimisation of direct and indirect storage costs [Kuboń 2008]. Therefore, the purpose of stock management is to ensure its possession in volume sufficient to carry out a specified activity at possibly lowest financial outlays incurred.

Work purpose and scope

The work's purpose is to determine stock level, structure, and gathering and keeping costs incurred by farms and reasons for keeping stock depending on production area size. The work scope covered 30 farms located in Ciężkowice Borough in Małopolskie Voivodeship.

The course and methods of research and calculations

The research was carried out in the form of directed survey interview based on a previously prepared questionnaire. The questionnaire consisted of 3 parts:

- the first part concerned general management conditions in the examined objects i.e.: land use structure, crop structure, livestock density size and structure, and technical means of production possession and use.
- the second part concerned storage potential and its use i.e.: storage area (space) and its utilisation, the structure of warehouse buildings, the size and type of stored goods, investment outlays, and maintenance costs for warehouse buildings and structures.
- the third part concerned stock keeping volume and structure, i.e.: the size and structure of own and purchased means of production (time, frequency, the volume of one-time shipment batch, transport service), goods storage place and period, reasons for stock keeping, and possibilities regarding stock level reduction.

Research results

Stock gathering continually accompanies logistic processes, running both inside and outside agricultural enterprises, which primarily involve flows of material streams [Skowronek, Sariusz-Wolski 2003]. Reserves occurring in supply, production or distribution processes are stored in warehouse buildings and structures constituting an integral part of logistic infrastructure [Kuboń 2008]. Fig. 1 shows the structure of raw material-goods flows in the examined objects – with particular emphasis on places where stock occurs. The primary places for stock occurrence were warehouses (sheds, barns) for raw materials and goods purchased in external markets. That's where the farmers were gathering materials for plant production (purchased items most often included mineral fertilisers, pest control products, fuels, sowable material), and for animal production (fodders, cleansers). The secondary places used to keep reserves were post-production stores (barns, attics in livestock buildings, silos), where farmers were gathering and keeping farm produce for future sale.

On average, the examined farms were purchasing $0.44 \text{ t}\cdot\text{ha}^{-1}$ arable land [AL] of plant production materials, and $0.12 \text{ t}\cdot\text{ha}^{-1}$ AL of animal production materials, which totalled $0.56 \text{ t}\cdot\text{ha}^{-1}$. The majority of purchased plant production materials were used directly in production (75.56%), and the remaining 24.44% were stored. In case of animal production materials, as much as 90.91% of the purchased goods were stored, and only 9.09% were used directly in production. The plant production volume in the examined farms reached $8.29 \text{ t}\cdot\text{ha}^{-1}$ AL, whereas the animal production volume reached $7.67 \text{ t}\cdot\text{ha}^{-1}$ AL, which totalled $15.96 \text{ t}\cdot\text{ha}^{-1}$ AL. As one may observe, total plant production was stored: 3.25% of

global production was allotted for sale and the rest was returned to the plant and animal production in the scope of internal rotation. 44.19% of the production volume returned to the plant production and 53.09% of it returned to the animal production in the scope of internal rotation. In the animal production, 11.60% of the production volume was sold directly to external markets, 4.82% was used for farm purposes, and the remaining 83.57% was stored. This was primarily cow dung and liquid manure.

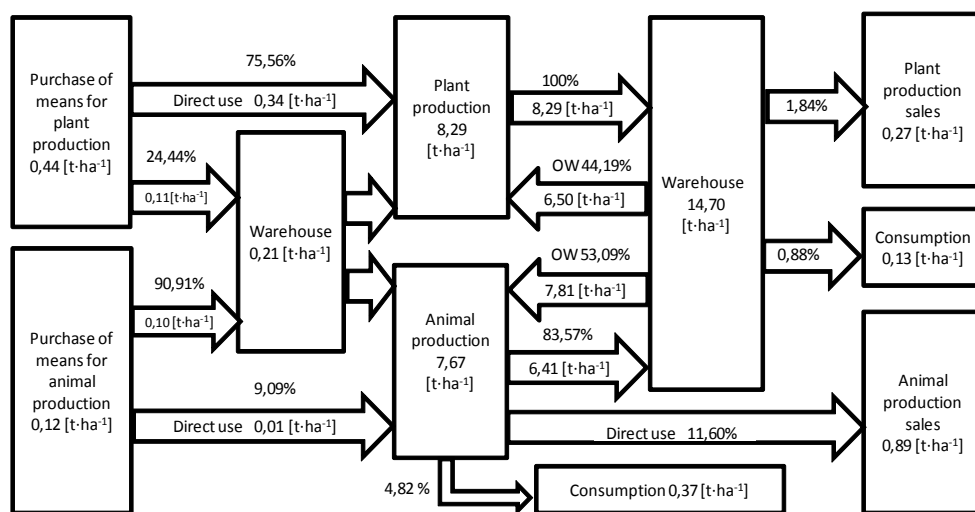


Fig. 1. The structure of raw material-goods flows in the examined farms

According to Wasilewski [2004], stock constitutes unused material goods kept by company for the future use. In farms, reserves appear mainly as raw materials, semi-finished products, parts used in production process, and/or finished products, and are among the main items of enterprise circulating assets. Stock management may be determined as an activity which purpose is to keep stock at the level guaranteeing normal enterprise functioning, while minimising the stock level due to maintenance costs, limited material allocations, etc.

Table 1 presents the stock level and structure in the examined objects.

In total, stock level in the examined farms was close to 14.9 t-ha⁻¹, for standard deviation 7.4 and variation coefficient 49.8%. It was observed that with the increasing of farm area, stock level grew from 6.9 t-ha⁻¹ in group A to 13.3 t-ha⁻¹ in group C, i.e. by 92.7%. Farm produce prevailed in stock structure, constituting 98.6% of total reserves. The remaining 1.4% was the stock accumulated in production materials. Identical proportions were observed in area groups, where the share of reserves in the form of farm produce ranged from 98.4 to 99.1%, and production materials: 0.9-1.6%.

Table 1. Stock level and structure in the examined farms [$t \cdot ha^{-1}$]

Specification		Stock		
		Total	Farm produce	Means of production
Altogether	Average	14.9	14.7	0.2
	Standard deviation	7.4	7.4	0.1
	Variation coefficient [%]	49.8	50.0	47.5
Group A (1-5 ha)	Average	6.9	6.8	0.1
	Standard deviation	2.9	2.9	0.1
Group B (5.01-10 ha)	Average	11.9	11.8	0.1
	Standard deviation	5.1	5.1	0.1
Group C (10.01-15ha)	Average	13.3	13.1	0.2
	Standard deviation	6.4	6.4	0.1

Fig. 2 shows dynamics of changes in stock volume in each quarter of years 2008/2009.

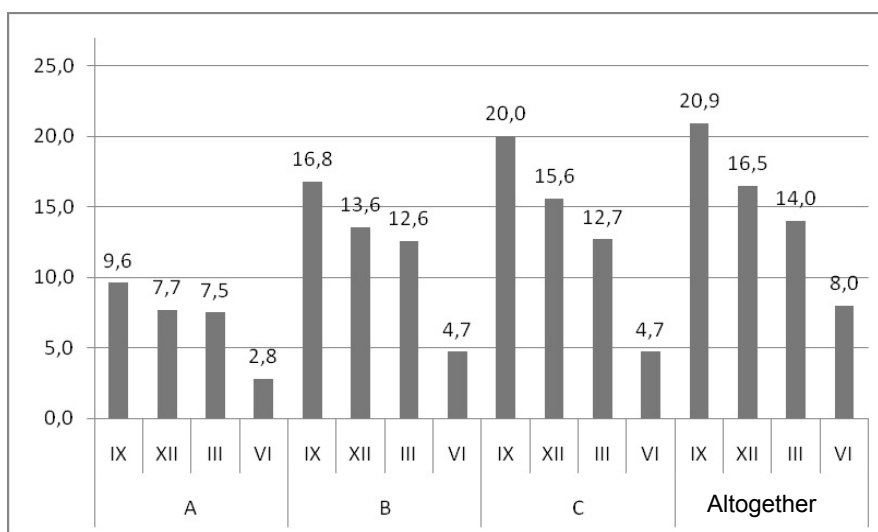


Fig. 2. Dynamics of changes in stock level in individual groups

In September, average stock level was $20.9 t \cdot ha^{-1}$, in December it dropped by 21% down to $16.5 t \cdot ha^{-1}$, compared to previous quarter in March it decreased by another 15.1% to reach $14 t \cdot ha^{-1}$, and in June the researchers observed drop to $8 t \cdot ha^{-1}$, which constituted 38.2% of the initial value. In September, average stock level was growing with the increase in farm size – from $9.6 t \cdot ha^{-1}$ in group A to $20.0 t \cdot ha^{-1}$ in group C. In June, in the smallest

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farms stock level dropped by 70.8% ($2.8 \text{ t}\cdot\text{ha}^{-1}$) compared to its initial value, in group B by 72.0% ($4.7 \text{ t}\cdot\text{ha}^{-1}$), while in the largest objects – by 76.5% and reached value $4.7 \text{ t}\cdot\text{ha}^{-1}$.

Costs Minimising stock keeping costs is essential for proper stock management. Too high stock level freezes capital and increases storage and protection costs. On the other hand, insufficient reserves may cause production interruptions and infringe on contracts with other enterprises [Wasilewski 2003]. It is particularly dangerous in the case of animal production, in which a lack of reserves does not involve the risk of production stoppage, as it is in industry, but deterioration of current production value. Stock gathering costs consist of the costs we incur while tracing stock levels in warehouse, and possibly deliveries on the way, when preparing an order, placing it at a supplier and receiving a delivery. Table 2 shows stock costs index for the examined farms, as the sum of stock gathering and keeping costs expressed in PLN per metric ton of stored goods.

Table 2. Stock costs index for the examined farms

Specification		Stock costs index	Stock keeping costs	Stock gathering costs
		PLN·t ⁻¹	PLN·m ⁻²	PLN·ha ⁻¹
Altogether	Average	87.2	18.8	170.1
Group A (1-5 ha)	Average	155.2	18.7	133.9
Group B (5.01-10 ha)	Average	90.5	19.0	339.8
Group C (10.01-15ha)	Average	49.0	18.8	36.7

The research proved that stock costs index for the examined farms was $87.2 \text{ PLN}\cdot\text{t}^{-1}$ of stored goods, on average. It was observed that stock costs index was decreasing with growing farm size – from $155.2 \text{ PLN}\cdot\text{t}_{\text{zi}}^{-1}$ to $49.0 \text{ PLN}\cdot\text{t}_{\text{zi}}^{-1}$. In the largest farms stock costs index decreased more than thrice compared to the smallest objects. Average stock keeping costs reached $18.8 \text{ PLN}\cdot\text{m}^{-2}$. Independently of the farm size, stock keeping cost was similar (ranging from $18.7 \text{ PLN}\cdot\text{m}^{-2}$ to $19.0 \text{ PLN}\cdot\text{m}^{-2}$), which is due to small differences in storage potential. Altogether, the stock gathering costs in the examined objects reached approximately $170.1 \text{ PLN}\cdot\text{ha}^{-1}$, where as much as 66.4% were car/truck operating costs. The highest stock gathering costs were observed in farms sized from 5.01 to 10.00 ha – $339.8 \text{ PLN}\cdot\text{ha}^{-1}$, and the lowest in the group of farms sized from 10.01 to 15.00 ha – only $36,7 \text{ PLN}\cdot\text{ha}^{-1}$. Car/truck operating costs within the general stock gathering costs were decreasing with the growing area of a farm – from 75.7% to 54.3%. This high discrepancy results from the difference in equipping the farms with means of transport used in supply and distribution processes.

60% of polled farmers specified the following reasons in support of stock keeping: protection against consequences of natural disasters and stock-out risk. The next in ranking were: protection against price changes, cyclical nature of production, and the supply within carried out production (internal rotation).

Conclusions

1. Average stock level in the examined farms was $14.9 \text{ t}\cdot\text{ha}^{-1}$, and was growing with increasing farm area from $6.9 \text{ t}\cdot\text{ha}^{-1}$ up to $13.3 \text{ t}\cdot\text{ha}^{-1}$. Farm's own produce was prevailing in the stock structure and the rest were products purchased in external markets.
2. In the examined farms, 39.2% of purchased means of production were kept, constituting the so-called pre-production stock and 92.1% of the generated produce constituted the main reserves - the so-called post-production stock. So high a share of stored goods has a particular impact on the stock keeping costs and to a large extent affects management efficiency.
3. On average, stock costs index in the examined farms was $87.2 \text{ PLN}\cdot\text{t}^{-1}$ of stored goods, and dropped with the increasing farm area from 155.2 down to $49 \text{ PLN}\cdot\text{t}^{-1}$.
4. Polled farmers specified the following as the main reasons in the support of stock keeping: protection against consequences of natural disasters and stock-out risk reduction; and 93.3% of farmers stated that there's no need to lower the current stock level in spite of high storage costs for goods.

Bibliography

- Golebska E.** (red.). 1999. Kompendium wiedzy o logistyce. PWN Warszawa-Poznań. ISBN 83-01-13856-4.
- Kuboń M.** 2008. Potencjał magazynowy oraz jego wykorzystanie w gospodarstwach rolniczych. Inżynieria Rolnicza 2(100). Kraków. s. 129-135.
- Kowalski St. Tabor S.** 2003. Koszty logistyczne w wybranych gospodarstwach rolniczych. Inżynieria Rolnicza 10(52). Kraków. s. 163-172.
- Skowronek Cz. Sarjusz-Wolski Z.** 2003. Logistyka w przedsiębiorstwie. PWE. Warszawa. s. 33-35.
- Wasilewski** 2004. Ekonomiczno-organizacyjne uwarunkowania gospodarowania zapasami w przedsiębiorstwach rolniczych. Wydawnictwo SGGW Warszawa. ISBN 83-7244-595-8.
- Wasilewski M.** 2003. Kształtowanie poziomu i kosztów zapasów w gospodarstwach rolniczych. Roczniki Nauk Rolniczych. Seria G – Ekonomika Rolnictwa. Tom 90. z. 1. s.11.

GOSPODAROWANIE ZAPASAMI W GOSPODARSTWACH O ZRÓŻNICOWANEJ POWIERZCHNI PRODUKCYJNEJ

Streszczenie. W pracy przedstawiono poziom, strukturę oraz koszty gromadzenia i utrzymywania zapasów w gospodarstwach rolniczych w zależności od wielkości powierzchni produkcyjnej, a także przyczyny utrzymywania zapasów w opinii ankietowanych. Średni stan zapasów w badanych gospodarstwach wynosił $14,9 \text{ t}\cdot\text{ha}^{-1}$ i rósł wraz ze wzrostem powierzchni produkcyjnej. Wysoki poziom zapasów ma swoje odzwierciedlenie w kosztach utrzymania i gromadzenia zapasów, które kształtowały się na poziomie $49-155,2 \text{ zł}\cdot\text{t}^{-1}$ zmagazynowanego towaru. Głównym powodem utrzymywania zapasów w badanych obiektach było zabezpieczenie przed następstwami klęsk żywiołowych oraz ograniczenie ryzyka wyczerpania zapasów.

Słowa kluczowe: zapasy, zarządzanie, koszty, towar, opinia

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