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# Inventory Management Strategies for Local Supply Cooperatives



# Abstract

## **Inventory Management Strategies for Local Farm Supply Cooperatives**

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This report presents fundamental yet important strategies for farm supply cooperatives to use during the everyday management of the inventory they purchase and carry for sale to patrons. Basic elements and concepts associated with strategies are described within the framework of a management plan. The goal is effective inventory management. This material is intended to provide farm supply cooperative managers and employees with information that will enhance inventory management in their cooperatives.

Key **Words**: Inventory management, merchandise, strategies, plan.

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## Preface

Effective inventory management is imperative for successful operation of farm supply cooperatives. Inventory management requires continuous decisionmaking. Cooperative managers can increase the probability of making good inventory management decisions by using fundamental inventory management strategies implemented as part of an organized plan.

The strategies and concepts described in this report do not include all the approaches that farm supply cooperative managers can use in developing or enhancing inventory management. Rather, this report selects and focuses on 10 fundamental strategies or concepts. These strategies or concepts should be included in cooperative plans for the everyday management of the merchandise ordered and held for sale and clearly understood by employees.

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## Highlights

Incorporating a well-organized inventory management plan will increase the probability of achieving effective results in managing the required inventory investment. Fundamental strategies should be implemented in a plan to reach the cooperative's clearly defined goals.

Strategies for an effective inventory management plan include:

- (1) Attain proper inventory mix-provide the goods and services that members (patrons) demand, the market reveals, contribute financially to the cooperative, and coincide with the cooperative's defined strategic direction.
- (2) Maintain efficient inventory levels-minimize the costs of having too little or too much inventory. Types of merchandise have different efficient levels, so understand them and work to attain the "correct" levels.
- (3) Minimize costs of inventory-make sure that all employees know the costs associated with maintaining (or not maintaining) inventory. Balance the cost of being out of stock with the cost of maintaining inventory at the least total inventory cost.
- (4) Order efficiently-balance the higher ordering costs associated with more frequent orders with the higher inventory maintenance costs associated with less frequent orders; use tools-economic order quantity, inventory reorder point, automated inventory systems, wholesale supplier programs, etc.
- (5) Understand pricing, markup, and margin concepts-make sure that all employees involved with the functions of selling merchandise understand the formulas and basic principles of price, markup, and margin.
- (6) Analyze inventory performance-examine the cooperative's financial performance relative to inventory. Analyze data and determine sales, gross margins, inventory turnover, and inventory management index.
- (7) Make physical inventory counts-carry out a count and report regularly.
- (8) Handle inventory like dollars-carefully handle inventory. Work to decrease shrinkage and follow correct handling procedures.
- (9) Merchandise and promote-take pride in the merchandising of inventory (display, showroom, warehouse) and develop product promotion programs.
- (10) Coordinate inventory among multiple branches-coordinate both purchases and sales among the different store and warehouse locations of the cooperative.

As part of the inventory plan, cooperatives need to regularly assess the effectiveness of their overall inventory strategy design. The resulting implications of employing their current inventory management strategies relative to serving members and achieving the cooperative's financial goals must be evaluated, given competitor presence and strategic behavior.

Build an inventory management plan-broad inventory management and specific performance goals should be developed and strategies employed to reach the goals. All cooperative employees involved with inventory must understand the plan, the components within it, and their responsibilities. Plan feedback is critical-goals and strategies must be monitored and then modified to achieve expected results.

# Inventory Management Strategies for Local Farm Supply Cooperatives

James J. Wadsworth

In farm supply cooperatives, as in all retail establishments, inventory designates merchandise carried for sale. Merchandise includes the physical items being moved from their primary source (the wholesale supplier) to their final destination (the member/patron).

Farm supply cooperatives serve their members/patrons by continuously buying and selling merchandise. The cooperatives derive their principal income from the sale of that merchandise.

The typical farm supply cooperative has a large investment in inventory. Data from a sample of U.S. cooperatives (table 1) indicate that the average local farm supply cooperative had \$521,000 invested in inventory at year end 1990. This investment made up a significant proportion of the sample cooperatives' assets-about 49 percent of current assets and 25 percent of total assets. As with other assets, farm supply cooperatives must strive for high returns on their inventory investments.

Cooperative managers must take inventory management seriously. The ability they demonstrate in managing inventory often translates into business success or failure. Inventory management involves constant decisionmaking that in turn requires astute planning. Planning for effective

inventory management involves understanding basic inventory management concepts and strategies and implementing them in an organized manner to reach defined goals.

This report addresses strategies and concepts related to the inventory management decisionmaking process. It provides information to help managers and employees prepare a plan for their cooperatives.

## PLANNING FOR EFFECTIVE INVENTORY MANAGEMENT

Like most management functions, effective inventory management does not just happen-it takes a lot of work. This can be simplified by taking an organized planning approach. Planning involves defining inventory management goals and incorporating strategies to meet those goals.

Figure 1 shows what an inventory management plan might entail for farm supply cooperatives. This plan involves defining a mission, broad goals and specific performance goals, implementing an array of inventory management strategies, and monitoring the plans (feedback).

The mission of effective inventory manage-

**Table I--Selected financial data from sample of U.S. local farm supply cooperatives, 1990<sup>1</sup>**

Variable	Mean	Minimum	Maximum	Standard Deviation
Inventory	\$520,773	\$8,558	<b>\$4,435,349</b>	\$548,630
Inventory/current assets	49.4%	14.9%	81.3%	14%
Inventory/total assets	25.2%	5.4%	57.7%	9%

<sup>1</sup> Source: U.S. Department of Agriculture, ACS farmer cooperative supplies and services data base. Number of cooperatives in sample = 139. See appendix table 1 for more data on U.S. local farm supply cooperatives.

ment is defined in the top box of the diagram. Broad goals are listed below the mission statement: service-to members (patrons) by providing merchandise that meets their needs and demands; efficiency-of inventory operations; cost containment-of costs associated with maintaining inventory; and competitiveness-with pricing and products. These broad goals, essentially providing the definition of effective inventory management in farm supply cooperatives, define specific performance goals, and incorporate strategies to meet the goals.

Management must define specific performance goals-in line with broader goals-related to inventory management. Figure 1 shows examples of specific performance goals: sales goals-relative to the cooperative's budget, set specific targets for gross sales of merchandise; capital investment goal-prescribe upper and lower limits for dollar inventory investment; gross margin goals-specify targets for gross margins attained on different classes of inventory and for inventory overall; turnover-see to reach specific levels (i.e., past performance levels, industry averages, etc.) of turnover relative to inventory type and gross margin percent; and management index-strive to achieve high inventory management indexes (i.e., past performance levels, industry averages, etc.).

Once specific performance goals are in place, upper management and line personnel should take responsibility for implementing specific strategies and concepts.

Ten inventory management strategies are listed in the bottom box in figure 1. (Their numbers correspond to those in the text.) These fundamental strategies need to be well understood so they can be effectively implemented. There is an inherent need for strategy cohesion during their implementation. In other words, strategies should be implemented within an organized framework because no single strategy can achieve all the goals of effective inventory management.

Strategies listed in figure 1 are:

- (1) attain proper inventory mix;
- (2) maintain efficient inventory levels;
- (3) minimize costs of inventory;

- (4) order efficiently;
- (5) understand pricing, markup, and margin concepts;
- (6) track inventory performance;
- (7) make physical inventory counts;
- (8) handle inventory like dollars;
- (9) merchandise and promote; and
- (10) coordinate inventory between multiple branches.

The feedback loop included in figure 1 indicates the need for assessing whether strategies are achieving the cooperative's goals. As in all strategic planning, feedback is critical to a plan's success. Plan initiators, developers, and implementors need to periodically assess goals and strategies. If goals are not correctly identified and strategies don't achieve desired results, modifications must be made to get the plan working correctly.

## **INVENTORY MANAGEMENT STRATEGIES**

The ten strategies listed earlier are explained in this section. Examples are included where possible to help clarify explanations and the concepts associated with the strategies.

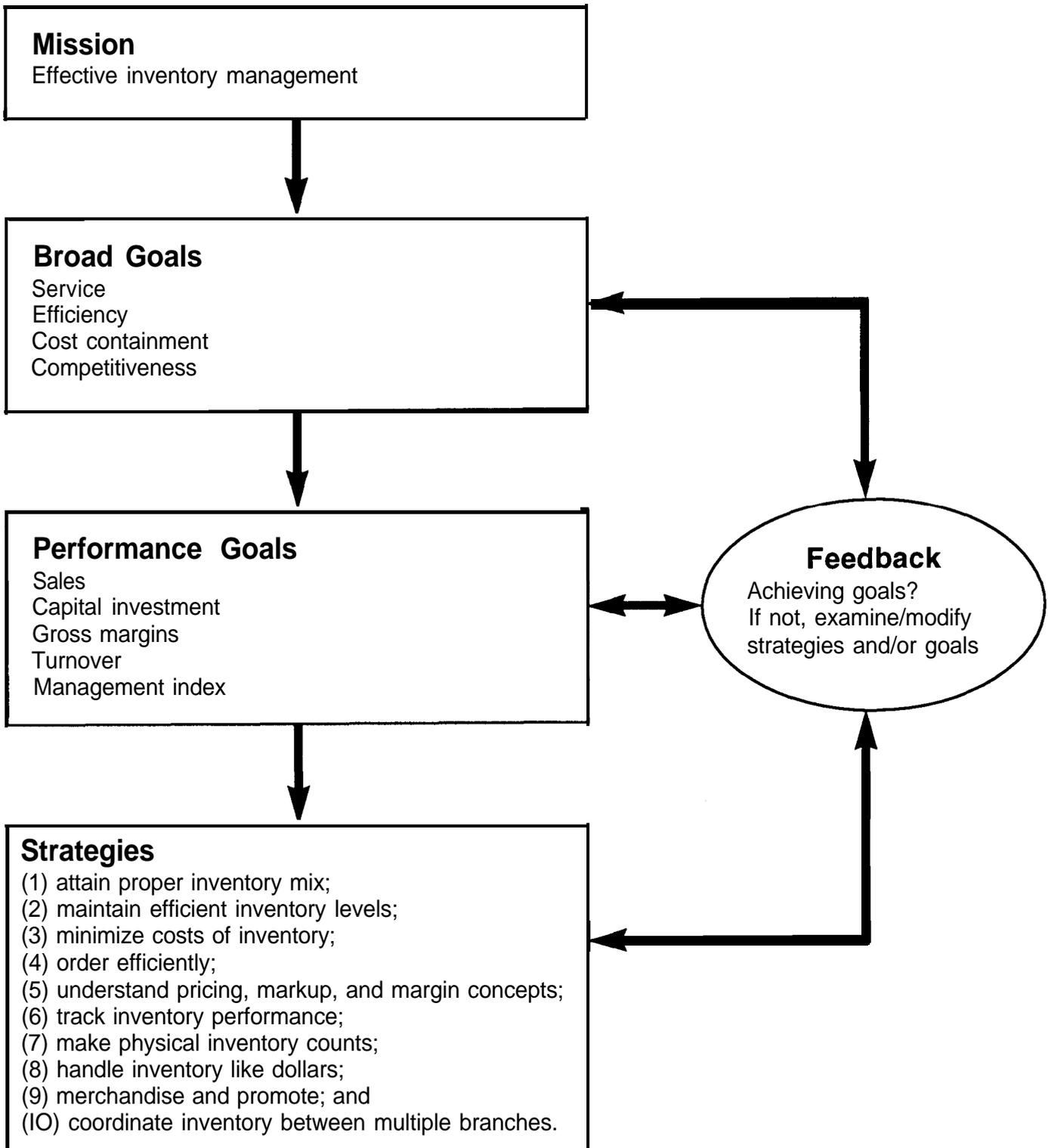
### **(1) Attain Proper Inventory Mix**

A good inventory mix is paramount to effective inventory management. For farm supply cooperative operations, inventory mix is maintaining the types of merchandise and providing related services that best serve the needs of patrons. A number of factors relate to a good inventory mix—the cooperative's strategic direction, needs and demands of patrons, financial performance, and market trends.

The cooperative's inventory mix reflects the strategic direction being followed. In other words, the types of inventory handled indicate what a cooperative is to its members and where it is going.

Cooperative management must continually analyze inventory to gauge whether it is consistent with the cooperative's intended strategic direction. Does the inventory mix indicate the direction the cooperative wishes to go? Do all inventory items

Figure 1— Planning Inventory Management



have an adequate market demand, or are some obsolete and unprofitable? Inventory in low demand and not reflecting strategic direction should be removed and such products or services discontinued.

Needs of patrons must be understood and anticipated, either by using a formal interview/survey approach or by frequently visiting with them. Management will then be able to better plan inventory to meet their needs. In special circumstances-when members are active patrons for some products and services and want their cooperative to maintain inventories of infrequently demanded products-high cost elements of an inventory mix can be a part of a strategic plan when its total costs are fully explained to the entire membership.

Financial analysis (e.g., sales and margin statistics) of merchandise provides a record of past performance and is a key factor in determining an inventory mix and evaluating a cooperative's strategic direction.

For instance, what are the sales and margin dollars for particular merchandise items and classes of inventory and what products or classes contribute the most margin dollars to the operation?

This type of analysis identifies the types of inventory contributing most to the cooperative's financial viability. Knowledge of these statistics and the trends they show help determine what inventory to carry and what to promote more heavily.

Trends and unexpected events in a cooperative's environment must be factored into the inventory mix. For this reason, regular market outlook must include a review of what competitors are doing-what their products are, services they offer, etc. Regular market outlook allows management to keep inventory mix current-to make adjustments such as increasing or decreasing certain merchandise lines, and eliminating or creating lines.

## **(2) Maintain Efficient Inventory Levels**

Inventory mix involves strategic planning to define the type of cooperative members want, while inventory levels involve operating decisions

to achieve efficiency and cost control. Inventory levels vary by product or service. Some merchandise requires high inventory levels while others require lower levels. The required inventory level is tied to the demand for the merchandise. An efficient level minimizes the costs of having too little or too much inventory. A balance must be maintained. Inventory level can be affected by product promotions, supplier performance, and delivery logistics.

For cooperatives, maintaining efficient inventory levels can pose a dilemma. As a service to members, cooperatives may not only include infrequent demand items in their inventory mix, but also maintain some popular products at higher levels to reduce the risk of depleting the stock. While this practice may be desirable to members, they must understand the costs associated with maintaining higher inventories and their adverse affect on profitability. Again, such decisions that entail higher costs must be made within an explicit strategic plan.

***Inventory Level by Type of Inventory*** There are three types of inventories: fast turnover, slow turnover, and seasonal. Fast turnover products should be stocked at high levels, slow turnover inventory should be stocked at low levels, and seasonal inventory should be stocked at levels that will enable the cooperative to meet demand but not be left with excess inventory at the end of the season.

Inventories of popular merchandise must be well stocked to meet patron demand. Examples of fast turnover products include animal feed, cleaning supplies, petroleum products, etc. The strategy is to maintain levels dependent on supplier and delivery logistics, sales history, and promotional activities.

Slow turnover inventories have low or unbalanced demand. Products are often large ticket items such as farm machinery, livestock equipment, household appliances, etc. The strategy is to maintain inventory levels dependent on demonstrated need, sales history, and promotions. Members should be encouraged to order this merchandise in advance to keep inventory costs low.

Seasonal inventories are determined by a fixed period when products are in high demand. When that season arrives, patrons usually won't wait for this merchandise because of their immediate operational needs related to the planting or harvesting season. The strategy is to build supplies in anticipation of the season; encourage pre-orders by patrons and maintain a suitable inventory; supply products known to be needed, and assess inventory level based on past sales and perceived demand.

### (3) Minimize Costs of Inventory

Inventory is costly. There are order and maintenance or holding costs associated with inventory. Costs include transportation, ordering, and physically placing merchandise in storage. Maintenance or holding costs include finance, storage, fire insurance, property taxes, and obsolescence (damage and deterioration). There is also an opportunity cost—the return that capital resources could earn if invested elsewhere—associated with the capital resources tied up in inventory.

Table 2 provides estimates on the value of inventory associated with maintenance costs. As a general rule of thumb, these costs range from 20 to 30 percent of the value of a cooperative's inventory annually. The cost of capital used for inventory ranges from 8 to 12 percent while obsolescence costs range from 4 to 6 percent. Deterioration and damage is also a major cost. Estimates range from 4 to 5 percent of inventory value.

**Table 2— Inventory maintenance cost breakdown**

Type of Cost	Percent of Inventory Value
Transportation	1/2 – 1
Handling	2 - 3
Storage facilities	1/2 – 1
Insurance	1/2 – 1
Taxes	1/2 – 1
Obsolescence	4 - 6
Deterioration/damage	4 - 5
Cost of capital	8 - 12
Total cost	20-30

While these are costs of doing business—holding merchandise to turn into receivables—inventory level has a direct bearing on how high or low these costs will be.

The major cost of an inventory level that is too high is inefficient use of capital. For example, if the cost of capital is 8 percent, each \$1,000 of excess inventory has the effect of reducing net income by \$80. Excess inventory reduces asset turnover, in turn reducing return on assets.

Carrying costs such as insurance, taxes, depreciation, and overhead (e.g., utilities, rent, and administration) increase with excess inventory. Obsolescence and shrinkage costs also increase due to spoilage, damage, and disappearance.

There are also difficult to measure costs due to insufficient inventory:

- Sales lost from depleted stock. The loss in gross margins is the volume lost multiplied times the gross margin usually attained from the sale of the item.

- Cost of losing disgruntled patrons (who have also purchased other merchandise).

- Cost of acquiring a poor service image. Some tangible costs associated with low inventory levels include special delivery and pick-up costs to satisfy patrons, added order costs, and time lost by employees.

Many wholesale suppliers offer booking or incentive programs to cooperatives that often include reduced wholesale prices for volume purchases. These programs must be carefully analyzed. If the merchandise isn't likely to be sold quickly, then it's probably not an advantage to purchase in large quantities.

With inventory maintenance costs averaging 20 and 30 percent of inventory value per year, the benefit derived from volume discounts quickly diminishes if sales are relatively slow. Volume discounts are only beneficial if the merchandise is in relatively high demand and can be sold quickly so that additional inventory maintenance costs are less than the discount.

*Example 1—Purchase of merchandise at a discount.* This illustrates the effect maintenance

costs have on margins when merchandise is purchased at a discount but remains in inventory because of slow sales. The normal cost of the merchandise is \$5,000 (\$10 per unit, thus 500 units) but a 10 percent discount lowers the cost by \$500 to \$4,500 (\$9 unit cost). Maintenance costs are estimated at 20 percent of the wholesale inventory value per year (1.66 percent per month).

The cooperative sells 25 units per month and each unit retails for \$12. Table 3 shows the impact of maintenance costs that accrue at 1.67 percent per month on the value of inventory not sold. Because sales are relatively slow at 25 units per month, the entire inventory volume is not sold in 12 months. Relatively high maintenance costs reduce margins substantially in the early months and have less of an impact in later months.

Inventory maintenance costs accrue to more

than \$500 by month 9 and thus eliminates all of the discount gained on the volume purchase. At this sales level and margin opportunity, this cooperative would have had better results if it had ordered this merchandise on a monthly basis (e.g., 30 units or so a month), even at the higher \$10 cost per unit.

Cooperatives need to carefully analyze volume incentive programs offered by suppliers. If sales, margins, and the discount are relatively high on a particular type of merchandise volume discount purchases can be of significant benefit. These purchases can provide extra margin and lessen the risk of running low on stock. But management must calculate maintenance costs to ensure that their levels do not counter the net positive effect associated with this strategy.

Cooperatives must balance the cost of maintaining inventory with the cost of being out of

**Table 3— Purchase of merchandise at discount, example 1 <sup>1</sup>**

Time	Units	inventory value	Monthly sales (units)	Monthly sales (\$)	Monthly maint. cost	Accrued maint. costs	Accrued margin dollars	Accrued margin after maint. costs
Month 1	500	\$4,500	25	\$300	\$71	\$71	\$75	\$4
Month 2	475	\$4,275	25	\$300	\$68	\$139	\$150	\$11
Month 3	450	\$4,050	25	\$300	\$64	\$203	\$225	\$23
Month 4	425	\$3,825	25	\$300	\$60	\$263	\$300	\$38
Month 5	400	\$3,600	25	\$300	\$56	\$319	\$375	\$56
Month 6	375	\$3,375	25	\$300	\$53	\$371	\$450	\$79
Month 7	350	\$3,150	25	\$300	\$49	\$420	\$525	\$105
Month 8	325	\$2,925	25	\$300	\$45	\$465	\$600	\$135
Month 9	300	\$2,700	25	\$300	\$41	\$506	\$675	\$169
Month 10	275	\$2,475	25	\$300	\$38	\$544	\$750	\$206
Month 11	250	\$2,250	25	\$300	\$34	\$578	\$825	\$248
Month 12	225	\$2,025	25	\$300	\$30	\$608	\$900	\$293

<sup>1</sup> Assumptions for example 1:

Total units purchased = 500.

Normal cost = \$10 per unit = \$5,000 total.

Discount = 10 percent = \$500 total discount.

Discounted cost = 55,000 - 5500 = \$4,500 total discounted cost.

Retail price = \$12 per unit.

Sales per month = 25 units.

Gross margin percent per unit = 25 percent.

Maintenance cost percent = 20 percent per year or 1.67 percent per month.

<sup>2</sup> Maintenance cost = inventory value (\$4,500) less value of sales times monthly maintenance cost (1.66 percent).

stock to achieve minimum total inventory cost. Out of stock costs decrease as inventory level increases, but maintenance costs increase and vice versa.

**(4) Order Efficiently**

Ordering is a major part of inventory management. Efficient ordering keeps inventory levels at correct levels. Inventory should be purchased in an organized manner. Inventory levels and quantities demanded must be carefully monitored. Selected individuals should be responsible for ordering inventory. Cooperatives with a broad line of merchandise may select individuals to be responsible for different classes of inventory.

There are two major variable costs associated with ordering a quantity of inventory: (a) the order processing cost and (b) the cost of maintaining the inventory.

A cooperative might place a few large quantity orders each year or many small ones based on certain factors. Placing a few orders will lower order processing costs, but increase inventory maintenance costs because the average inventory level will be large. Placing many orders will increase order processing costs, but lower inventory maintenance costs because the average inventory level will be small. The next example shows how order processing and maintenance costs vary by order size for a highly demanded item.

*Example 2-Costs associated with different order sizes.* A cooperative sells 100 tons of hog feed a year in 50 pound bags (4,000 units). The order processing cost is \$6, the wholesale price per bag is \$6, and the annual inventory maintenance cost is 20 percent of the wholesale inventory value. Table 4 shows that as order size increases, the annual cost of ordering decreases while the inventory maintenance cost increases, and vice versa. The 200-unit order quantity provides for the least total annual costs (\$240). The 175- and 225-unit quantities are in the general vicinity (\$242 total annual costs).

This example shows that the best order strategy balances the higher ordering costs associated with more frequent orders with those associated with less frequent orders.

Figure 2 graphically illustrates inventory costs. The total cost curve is the sum of the maintenance and ordering costs at various inventory quantity levels. The cost of maintaining inventory increases steadily as order quantity increases while ordering costs decrease. The minimum point on the total cost curve is where the cost of maintaining inventory equals the cost of ordering inventory. This is the goal to seek when ordering particular merchandise items. This quantity is commonly known as the economic order quantity (EOQ).

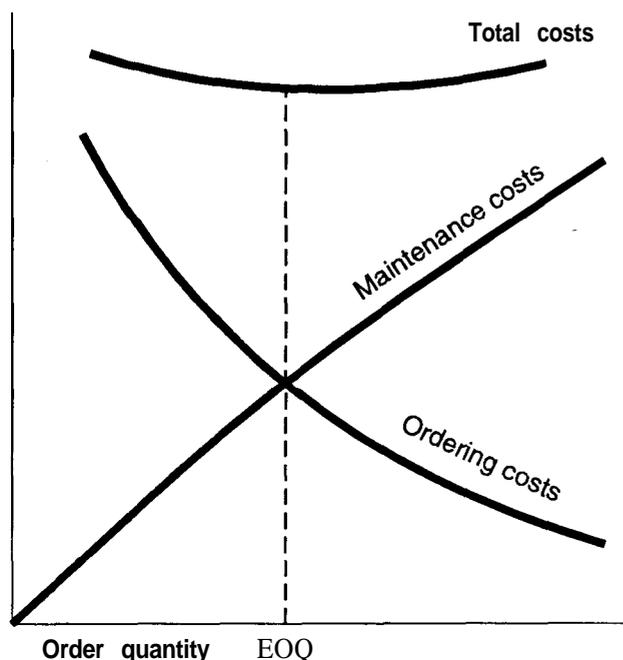
**Economic Order Quantity** EOQ is a useful inventory management concept for finding the

**Table 4-Costs associated with different order sizes, example 2 <sup>1</sup>**

Order size (quantity)	50	100	150	175	200	225	250	300	400	500
Average inventory	25	50	75	87.5	100	112.5	125	150	200	250
Number of times to order	80	40	27	23	20	18	16	13	10	8
Annual ordering costs	\$480	\$240	\$160	\$137	\$120	\$107	\$96	\$80	\$60	\$48
Annual maintenance cost	\$30	\$60	\$90	\$105	\$120	\$135	\$150	\$180	\$240	\$300
<b>Total annual costs</b>	<b>\$510</b>	<b>\$300</b>	<b>\$250</b>	<b>\$242</b>	<b>\$240</b>	<b>\$242</b>	<b>\$246</b>	<b>\$260</b>	<b>\$300</b>	<b>\$348</b>

<sup>1</sup> Assumptions for example 2:  
 4,000 units sold per year, wholesale value \$6 per unit.  
 Order cost \$6 per order.  
 Maintenance cost is 20 percent of inventory value (\$1.20 per unit).  
 Annual ordering cost = \$6 x number of orders.  
 Annual maintenance cost = \$1.20 per unit x average inventory.

**Figure 2—Best Curves of Inventory Management**



EOQ = economic order quantity: minimum total cost quantity

efficient quantity of select inventory items to order. The EOQ quantity corresponds with the minimum total inventory cost (ordering and maintenance costs are equal). The concept is most adaptable to merchandise regularly in high demand (fast turnover). Using this tool requires knowing how much of an item is needed during a given period (usually a year), the cost of processing an order, maintaining inventory, and the per-unit price.

Some fundamental mechanics must be followed to successfully meet these requirements:

- Keep accurate inventory figures.
  - Record sale rates of individual items that account for seasonal variations and ranges of unexpected variations in sales (i.e., management should analyze within year trends, year to year trends, 3-to-5 year moving averages, etc.).
  - Record costs associated with processing orders, purchase prices, and maintaining inventory.
- The EOQ minimizes total costs calculated by

knowing the units of merchandise needed during a given period, the cost of processing an order, the per-unit purchase price of merchandise, and the annual cost of maintaining the inventory.

This tool determines the amount of inventory to order, but to be pragmatic, managers should use the derived quantity to determine the order range. Using a range around the optimal point usually will not significantly increase total costs.

The economic order quantity is calculated using this formula:

$$\text{Economic order quantity (EOQ)} = \sqrt{\frac{2 \times u \times c}{P \times MC}}$$

where:

U = units of merchandise needed during period,  
C = cost of processing an order (employee time, paperwork, phone calls, etc.),

P = price per unit of merchandise being purchased, and

MC = annual inventory maintenance cost as a percent of annual inventory value.

These two examples provide an analysis of EOQ for a high- and a low-demand item.

*Example 3—EOQ of high-demand merchandise.*

Using the same merchandise example as in example 2, the EOQ is calculated for a cooperative's sales of bagged hog feed:

- U = units of feed  
= 4,000 units (200,000 lbs. ÷ 50 lbs./bag),
- C = cost of processing order = \$6,
- P = price per unit  
= \$6,
- MC = annual maintenance cost (inventory value)  
= 20 percent.

$$(\text{EOQ}) = \sqrt{\frac{2 \times 4,000 \times 6}{6 \times .2}} = \sqrt{40,000} = 200 \text{ units}$$

For the lowest total cost, the cooperative should order 200 units 20 times (4,000 units ÷ 200 units) a year (corresponds to the fifth column of table 4 from example 2).

*Example 4—EOQ of low-demand merchandise.* A cooperative sells 50 electric fence control units a year. The per-unit price is \$100 (the processing and maintenance costs same as above). The economic order quantity would be:

U = 50 units  
 c = \$5  
 P = \$100  
 MC = 20 percent

$$(EOQ) = \sqrt{\frac{2 \times 50 \times 5}{100 \times .2}} = \sqrt{25} = 5 \text{ units}$$

The cooperative should make 10 orders of 5 fence controller units each during the year.

**Inventory Reorder Point** Another tool is the Inventory Reorder Point (IRP). This concept requires setting a safety stock level of inventory, knowing the lead time it takes to deliver an order, and knowing how many units (average) of an item are sold during a given time period (usually a day). To use this concept, cooperative management must:

- Establish a safety stock level for individual items. This is the lowest acceptable level that inventory should reach by the time the next shipment arrives. This level allows the cooperative to meet patron needs during periods of unusually high demand.
- For individual items determine the “order time” between the date the order is placed and expected delivery. Add the safety stock level to the amount of inventory required during the lead time. Here’s the formula:

$$\text{Reorder point} = \text{safe level} + \text{required inventory}$$

Required inventory is calculated by multiplying the order time in days by the average sales per day.

*Example 5—IRP.* This example also uses bagged hog feed. The cooperative has average sales of about 13 units a day (4,000 units ÷ an assumed 310 business days a year), sets a safety stock level

of 10 units, and has an order lead time of 3 days for bagged feed. The EOQ is 200 units (see examples 2 and 3). The inventory required for the 3 days lead time is 39 units (13 units/day x 3 days) so the IRP is 49 units (39 units required + 10 units safety stock level). Thus, the cooperative would order 200 units when inventory level drops to 49 units (about every 11 to 12 days).

An IRP is calculated by determining a safety stock level and an accurate estimate of order time. The safety stock level is a sufficient inventory to cover the maximum expected sales of inventory between the order and delivery. The order or lead time is the period between ordering and inventory arrival. To ensure enough inventory is available to cover sales during this period, it is critical to have prior knowledge of order time. Past experience and use of accurate sales and delivery data usually provide accurate data on safety stock levels and order time.

Figure 3 illustrates inventory management of merchandise with stable demand. This inventory frequently turns so a constant quantity of 350 units (the EOQ) is ordered at regular intervals. This is commonly referred to as the fixed order quantity method. Figure 3 illustrates that the EOQ of 350 units is ordered when the IRP of 150 units is reached. Under this scenario, the time period between orders is the same. During the 10-day order time, sales continue at the rate of 10 units per day, thus a total of 100 units. Inventory reaches the safety level of 50 units before the new merchandise is received. The 350-unit order brings the level of inventory back up to 400 units.

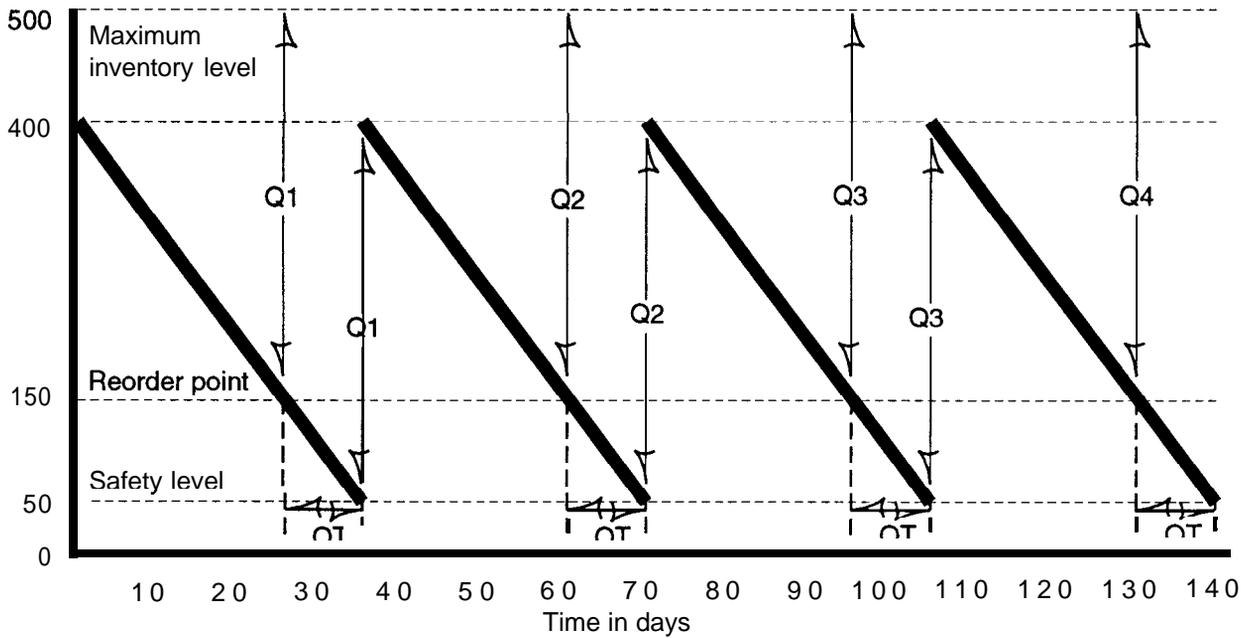
Figure 4 illustrates inventory management of merchandise that has varied demand-slow turnover. Order timing depends on when the inventory reaches the reorder point.

In the first two trend lines, strong demand causes a rapid depletion of inventory stock after orders are made at the reorder point. The third line shows that the order Q2 does not bring the inventory level above the reorder point, making it necessary to reorder Q3 at the same time inventory Q2 is received.

The lower demand indicated by the third

**Figure 3— Inventory Level Management Given Stable Demand**

Quantity of inventory ordered



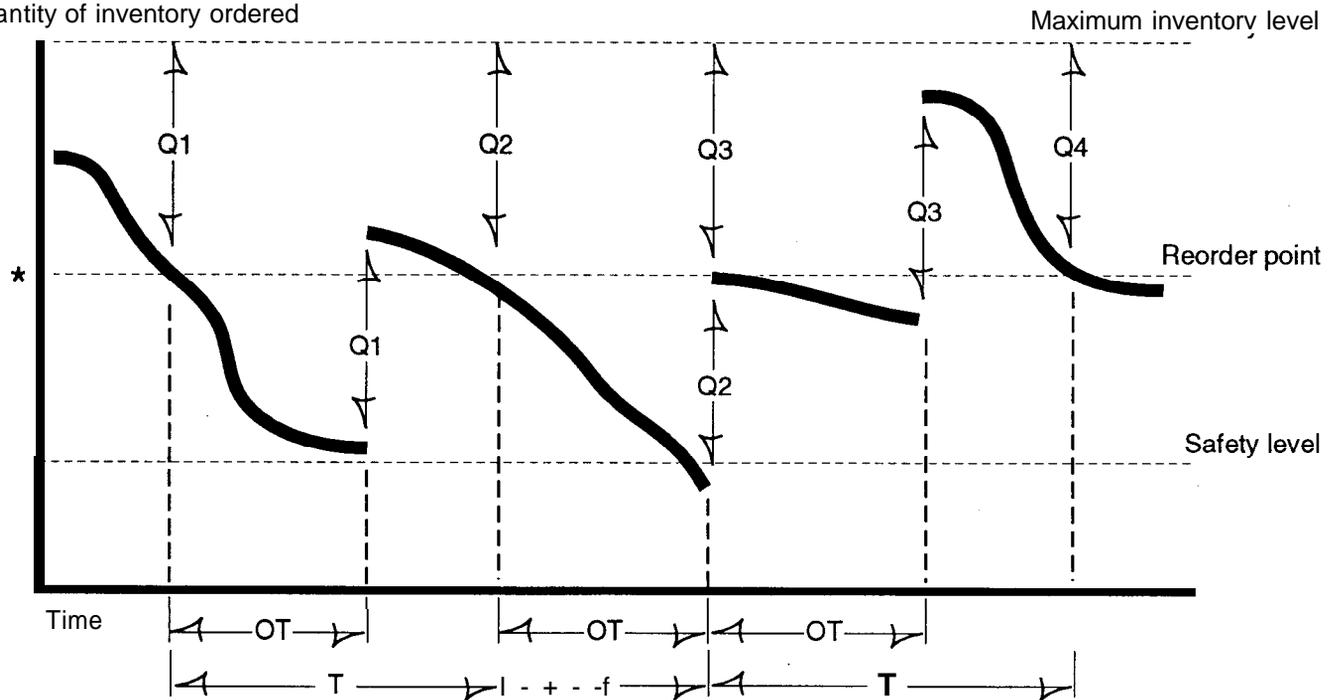
Q1 , Q2, Q3, and Q4 = quantity ordered = 350 units when inventory level drops to 150 units.

OT = order time = 10 days.

Thick line denotes inventory level.

**Figure 4— Inventory Level Management Given Unbalanced Demand**

Quantity of inventory ordered



OT = order time.

T = time between orders.

trend line allows inventory level to recoup well above the reorder point only to have demand dramatically increase. In this scenario, the time between orders varies depending on the rate of sales. Sales of this merchandise are not predictable, so the safety level may or may not be reached.

**Automated Inventory Systems** Automated inventory systems aid in their systematic control. Through computerized systems (e.g., point of sale-POS), cooperatives can track sales of merchandise on an individual item basis as well as by inventory class. Perpetual inventory systems—

**Vendors/Suppliers** supply cooperatives purchase inventory from vendors. Often, local cooperatives are members of a regional cooperative from whom they purchase most of their inventory. In this case, the regional is the local cooperative's primary supplier. Most regionals require their locals to purchase a significant amount of inventory. On the other hand, some independent locals develop their own supplier system, purchasing their inventory from many vendors.

Cooperative managers must work to develop relationships with vendors that result in efficient inventory purchasing. For farm supply locals that are members of regionals, management should work for special deals when purchasing a significant volume of a given type of inventory through the regional.

When the marketplace creates a situation

where a local is having difficulty competing on certain goods or services, the manager should ask the regional for help in alleviating the problem.

For inventory that locals purchase from vendors or suppliers other than regionals, local management must shop for a supplier that can give the cooperative the best deal. This is a continuous effort because suppliers often change their products and pricing relative to the circumstances of their own competitive market.

The inventory ordering process for farm supply cooperatives often entails attending product promotion meetings and information conferences conducted by specific wholesale suppliers, and participating in early order conventions where many supplier-vendors promote their products, offer order incentives, and book deliveries for future dates.

Such programs can be an extremely important aspect of inventory management. Solid product promotion and market information programs give managers insight into expected future sales and provide important education on how to successfully promote products for greater sales.

Most farm supply cooperatives use an early booking strategy for high-demand farm supplies. This involves the use of special programs to urge patrons to pre-order supplies in advance of when needed.

This strategy affords cooperatives the ability to order inventory contingent on what they know they will sell. Cooperatives can take advantage of special programs (early order and bulk discount incentives) presented by wholesale suppliers (vendors).

## **(5) Understand Pricing, Mark-up, and Margin Concepts**

Employees must fully understand the pricing,

mis-

takes will likely increase and inventory costs will increase.

Markup is the percentage amount (or actual amount) above cost that merchandise price is increased for retail sale. The percentage is calculated on a cost basis. Gross margin is the difference between retail price and purchase price. Percent gross margin is calculated on a retail price basis. The formulas for calculating the percentages for markup and gross margin are:

$$\text{Markup} = \frac{\text{price} - \text{cost}}{\text{cost}} \times 100$$

$$\text{Gross margin} = \frac{\text{price} - \text{cost}}{\text{price}} \times 100$$

*Example 6-Markup and gross margin.*

$$\begin{aligned} & \frac{\text{price of } \$50 - \text{cost of } \$35}{\text{cost of } \$35} \times 100 \\ &= \frac{\$15}{\$35} \times 100 = 42.86\% \end{aligned}$$

$$\begin{aligned} \text{Gross margin} &= \frac{\text{price of } \$50 - \text{cost of } \$35}{\text{price of } \$50} \times 100 \\ &= \frac{\$15}{\$50} \times 100 = 30.00\% \end{aligned}$$

When merchandise is readied for sale, some items are priced via market dynamics-competitive pressures. Other merchandise is priced based on the gross margin management wants to attain. The desired margin is added to purchase price to set the retail price. If a certain gross margin percent is needed, the following formula is used to derive retail price.

$$\text{Retail price} = \frac{\text{cost}}{(1 \times 100\%) - \text{gross margin (percent)}}$$

*Example 7-Retail price calculation.* A cooperative purchases an item at wholesale for \$10 and wants a 25-percent gross margin. The retail price would be \$13.33, calculated by:

$$\begin{aligned} \text{Retail price} &= \frac{\text{cost of } \$10}{(1 \times 100\%) - \text{gross margin of } 25\%} \\ &= \frac{\$10}{75} \times 100 = \$13.33 \end{aligned}$$

Because \$13.33 is an unusual number for the price of an item, the price would be rounded to \$13.29 or \$13.39.

## (6) Track Inventory Performance

Management must analyze and track the cooperative's financial performance as it relates to inventory. The analysis should examine data relative to inventory turnover rate, gross margins, and sales. These ratios should be regularly analyzed and tracked in total and by inventory class. This section provides information and examples on some important concepts that should be included in routine inventory performance examinations.

**Inventory Turnover Ratio** The turnover ratio indicates the liquidity of inventory. It tracks the rapidity with which inventory is turned over into receivables through sales during the accounting period. This ratio is calculated by dividing cost of goods sold by average inventory:

$$\text{Inventory turnover ratio} = \frac{\text{cost of goods sold}}{\text{average inventory}}$$

$$\text{Average inventory} = \frac{\text{beginning} + \text{ending inventory}}{2}$$

As earlier indicated, types of inventory turn at different rates. Some turn many times and others

only a few times. The turnover ratio aids in inventory management. It should be routinely calculated for classes of inventory, individual items, and for all inventory combined.

Turnover ratios should be judged in relation to past and expected future ratios of the cooperative and against ratios of other cooperatives (or farm supply businesses), and available industry averages. But be careful when comparing inventory turnover ratios to industry averages.

Departures from industry averages do not always indicate a business is doing especially well or badly. A high inventory turnover ratio could not only indicate efficient inventory management, but also a serious inventory shortage and inefficient management. In many instances, low inventory levels translate into sales losses.

On the other hand, a low ratio implies a large investment in inventories relative to the amount needed to service sales. This indicates excess inventories that tie up capital resources and increase maintenance costs. Performance has been adversely affected.

Table 5 provides some inventory turnover guidelines for product categories commonly carried by farm supply cooperatives. Some inventory categories turnover only a few times while others turnover more often. A turnover ratio of 7 to 10 times is a common guideline for total inventory.

The average inventory turnover ratio for U.S. local farm supply cooperatives was 7.68 in 1990, according to data in appendix table 1 (same sample of cooperatives discussed earlier in table 1). In four different size groupings established by sales volume, the inventory turnover ratio averaged between 6.84 and 8.10.

**Table 5—Inventory turnover guidelines**

Inventory classification	Inventory turnover ratio
Petroleum	7 – 10 times
Hardware	2 – 3 times
Feed	10 – 12 times
Fertilizer	2 – 3 times
Tires/batteries/auto	3 – 4 times
Miscellaneous items	7 – 10 times
Overall	7 – 10 times

**Inventory Management Index** The inventory management index measures profitability. It analyzes inventory turnover related to gross margin.

The inventory management index relates the turnover of inventory with the gross margin return the inventory generates. It is calculated by multiplying the inventory turnover ratio by gross margin percent. The formula is:

$$\text{Inventory management index} = \frac{\text{Inventory turnover ratio} \times \text{Gross margin percent}}{100}$$

This index is simple to analyze—the higher the resulting index, the better inventory management. Cooperatives should strive for an index of 1.0 that usually yields profitable results. For example, if the gross margin of a class of inventory is 25 percent, that inventory should be turned over four times during the year to achieve an index of one ( $.25 \times 4 = 1$ ).

*Example 8—Inventory management index.* This example calculates the inventory management index for an inventory class—hardware. Data include:

- . hardware sales = \$25,000
- beginning inventory = \$4,000
- . purchases during year = \$20,000
- . ending inventory = \$5,000
- . cost of goods sold = \$4,000 + \$20,000 - \$5,000  
= \$19,000
- . average inventory =  $(\$4,000 + \$5,000) \div 2$   
= \$4,500
- . gross margin = \$25,000 - \$19,000  
= \$6,000
- . gross margin percent =  $\$6,000 \div 25,000$   
= 24 percent

Using these data, the inventory turnover ratio is  $\$19,000$  (cost of goods sold)  $\div$   $\$4,500$  (average inventory) = 4.2 times and the inventory management index is  $4.2$  (inventory turnover)  $\times$   $.24$  (gross margin percent) = 1.01.

This example shows that hardware inventory is relatively well managed. The turnover ratio is above the guideline for hardware of 2 to 3 times

(table 5) and the inventory management index is more than one.

Turnover and management index calculations should be made regularly on all classes of inventory, the cooperative overall, and on individual inventory items. Some classes or types of inventory will have relatively high indexes while others will have low ones. This is normal. Some classes or

types will essentially subsidize other parts of the inventory. Strive for an overall high index for total inventory.

The average U.S. local farm supply cooperative in 1990 had an inventory management index of 1.37 (table 6). The average gross margin was 18 percent and operating margin was 2.7 percent. Based on this data, the average cooperative managed its

**Table 6—Selected financial data from sample of U.S. local farm supply cooperatives, 1990<sup>1</sup>**

Variable	Mean	Minimum	Maximum	Standard Deviation
inventory turnover ratio	7.68	2.63	21.46	3.62
Gross margin	18.2%	6.3%	30.7%	3.9%
Inventory management index	1.37	0.45	4.67	0.67
Operating income/sales	2.7%	-4.9%	8.6%	2.7%

<sup>1</sup> Source: U.S. Department of Agriculture, ACS farmer cooperative supplies and services data base. Number of cooperatives in sample = 139. See appendix table 1 for more data on U.S. local farm supply cooperatives.

<sup>2</sup> Inventory turnover ratio = average inventory ÷ cost of goods sold; average inventory = (beginning inventory + ending inventory) ÷ 2.

<sup>3</sup> Inventory management index = inventory turnover x gross margin percent.

**Table 7—Financial data of a mid-size local farm supply cooperative, example 9**

	Total	Inventory classification					
		Farm Supplies <sup>1</sup>	General Merchandise*	Feed	Seed	Fertilizer	Chemicals
Net sales	\$14,820,000	\$1,830,000	\$2,850,000	\$5,920,000	\$1,060,000	\$2,300,000	\$860,000
Beginning inventory	1,540,000	370,000	770,000	180,000	80,000	50,000	90,000
Purchases	12,380,000	1,520,000	2,210,000	5,130,000	830,000	1,930,000	760,000
Ending inventory	1,720,000	430,000	800,000	230,000	90,000	40,000	130,000
Cost of goods sold	12,200,000	1,460,000	2,180,000	5,080,000	820,000	1,940,000	720,000
Gross margin	2,670,000	380,000	680,000	850,000	250,000	370,000	140,000
Average inventory	1,620,000	400,000	780,000	210,000	80,000	40,000	110,000
Total assets	8,370,000						
Operating expenses	1,720,000						
Net income	950,000						
Performance measures:							
Inventory turnover <sup>3</sup>	7.53	3.65	2.79	24.19	10.25	48.50	6.55
Gross margin/net sales	18.02%	20.77%	23.86%	14.36%	23.58%	16.09%	16.28%
Management index <sup>4</sup>	1.36	0.76	0.67	3.47	2.42	7.80	1.07
Return on assets <sup>5</sup>	11.35%						
Inv./total assets <sup>6</sup>	20.55%						

<sup>1</sup> Farm supplies refers to general farm supply merchandise not included in other categories (e.g., cleansers, animal medicine, small farm equipment, fencing, etc.).

<sup>2</sup> General merchandise refers to hardware, lawn and garden, clothing, appliances, etc.

<sup>3</sup> Inventory turnover = cost of goods sold ÷ average inventory; average inventory = (beginning inventory + ending inventory) ÷ 2.

<sup>4</sup> Management index = inventory turnover x gross margin percent.

<sup>5</sup> Return on assets = net income ÷ total assets.

<sup>6</sup> Year-end inventory figure used in calculation.

inventories relatively well as suggested by the management index over one and relatively profitable, as suggested by the operating margin of 2.7 percent. (See appendix table 1 for these same figures categorized by cooperative size.)

*Example 9—Inventory performance analysis.*

Table 7 illustrates the type of analysis farm supply cooperatives should regularly conduct to assess their performance of operations as related to inventory. This table shows an example analysis of a cooperative with total merchandise sales of \$14.8 million. The analysis table includes merchandise sales, beginning and ending inventory, purchases, cost of goods sold, gross margins, total assets, operating expenses, and various measures related to the operational and inventory performance. The table provides total figures and some breakdown by inventory classification—farm supplies, general merchandise, feed, seed, fertilizer, and chemicals.

For the year, the average inventory was \$1.6 million for the cooperative in table 7. Total inventory turnover was 7.5. By merchandise class, turnover fluctuated from 2.8 for general merchandise to 48.5 for fertilizer (the general merchandise ratio is relatively low, but all other inventory categories fall within or exceed the turnover guidelines specified in table 5). The cooperative's overall inventory management index was 1.36.

Like the inventory turnover ratio, the management index fluctuated among the merchandise classes, from 0.67 for general merchandise to 7.8 for fertilizer. Other measures include gross margin to net sales of 18 percent, return on assets of 11.4 percent, and inventory to total assets of 20.6 percent.

Regularly conducting an analysis like this (preferably monthly but at least annually) permits management to identify problem areas and make adjustments for more effective inventory management.

### **(7) Make Physical Inventory Counts**

Making physical inventory counts is a basic but critical inventory management procedure. Regular counts control pilferage, decrease the

potential for excess and redundant inventory, keep inventory insurance premiums at correct levels, and provide information on the cooperative's storage conditions. Counts also identify specific shortage and problem areas so management can then take corrective measures.

Procedures for effective physical inventory counts include:

- count on a regularly scheduled basis;
- count accurately;
- count in a coordinated, organized manner;
- count using easily understood inventory forms; and
- report physical levels accurately for accounting and insurance purposes.

All employees involved in the process must recognize the importance of taking a physical inventory and procedures to follow.

### **(8) Handle Merchandise Like Dollars**

Inventory is a major portion of current assets. They are short-term funds the cooperative has invested to earn returns. Therefore, inventories are comparable to actual dollars and should be handled as such. When merchandise is stolen or damaged due to improper handling, money is lost. Types of shrinkage and methods for handling merchandise should be well understood. Procedures should be followed to minimize losses.

**Inventory Shrinkage** Inventory shrinkage is a problem in retail business. Sound inventory management techniques can counter the problem. Shrinkage occurs from merchandise deterioration, damage, and pilferage (both internal or external). Inventory on the books that cannot be sold diminishes turnover and reduces inventory management efficiency. Poor inventory handling and poor control practices contribute to shrinkage. A number of strategies help control deterioration and damage:

- rotate inventory—first in, first out;
- carefully load and unload inventory and check invoices and dock receipts;

- . control pests and maintain equipment and facilities;
- . store inventory in an organized and safe manner; and
- . handle inventory carefully.

Here are strategies that help guard against pilferage:

- . take a physical inventory count regularly;
- organize warehouse inventory so patron activity can be monitored;
- . stock high-value merchandise away from doors (warehouse and showroom);
- . maintain inventory at efficient levels;
- . check patron warehouse docking slips carefully;
- . complete periodic management checks on incoming inventory against packing slips or receiving invoices;
- . organize showroom to allow for full visibility of patrons; and
- . use perpetual inventory system or some other automated system that continually accounts for inventory received and sold.

**Warehousing** Follow correct inventory warehousing procedures. Most inventory damage and deterioration occurs in the warehouse. Poor handling and sloppy organization and storage of inventory contribute to losses. Warehouse inventory must be stored in an organized, systematic, and efficient manner. Proper handling and storage help protect against damage, make inventory more readily available for sale, aid in loading delivery trucks and patron vehicles, and help in taking physical counts. Patrons often walk through the warehouse, so it is important that they see a clean inventory environment where merchandise is well organized, well kept, and handled with respect and care.

#### *Proper Warehousing Techniques-*

- \* Stack inventory (pallets, boxes, etc.) in neat rows with sufficient aisle space between rows.
- . Store inventory in an organized manner.
- . Rotate inventory so first-arrived product is sold first.

- . Handle products carefully to avoid damage.
- . Repair damaged merchandise immediately (e.g., tape a torn bag of fertilizer).
- . Keep warehouse clean and inventory correctly placed.
- . Monitor loading slips closely so the correct amount of merchandise is given to patrons.
- . Check dock receipts against incoming inventory to ensure that the right types and amounts of merchandise are received.

Personnel should be acquainted with warehouse techniques and understand costs associated with techniques that lead to inventory **damage**—improper rotation, poor storage methods, and inaccurate receiving, counting, and distribution of inventory. Provide incentives to warehouse personnel to reduce inventory shrinkage and ensure that proper warehouse techniques are followed.

## **(9) Merchandise and Promote**

Merchandising showroom inventory is also important. Well-displayed products enhance sales. Show merchandise relative to the type of merchandise carried, promote specific products, and consider the size and layout of the showroom. Sound merchandising practices contribute to more effective inventory management by decreasing inventory damage, theft, and loss, making it easier to find and order inventory (control), and making patrons want to own displayed merchandise.

***Store Layout and inventory Display*** Store layout and inventory displays can boost sales. Effective merchandise displays can turn “just looking” shoppers into buyers.

To achieve the most productivity from the store, arrange merchandise in an organized manner. Departmentalization-breaking the showroom into specific departments based on type of merchandise-effectively organizes inventory, both for use of space and satisfaction of patrons.

Vary display techniques. Displays should be a mixture of both gondolas (shelving units) and floor displays. Wall displays are suited to particular products-long-handled tools and hanging items.

Due to the small size of most showrooms compared with the size and scope of products carried, it helps to place large-ticket items (e.g., lawn tractors) in a centralized floor display. Gondolas are best for small merchandise that can be separated into compartments or shelved separately.

Housekeeping is fundamental to proper inventory merchandising and promotion. Dusty merchandise, faded labels, and shopworn items detract from sales. Keep showroom aisles clear, lights properly working, and the floors and windows clean for shoppers' convenience and safety. Make regular checks to replace misplaced merchandise. Keep bin and wall hanging merchandise correctly sorted.

#### *Showroom Layout and Display Techniques—*

A number of techniques should be used for effective showroom layout and merchandise display:

- Carefully arrange merchandise. Plan placement so patrons get maximum exposure to the merchandise displayed during their normal movements in the showroom. Strategically place special advertised displays. For example, put seasonal clearance merchandise in the back of the showroom. Keep sale items in their usual place and use signs to direct patrons to those areas. Shelf signs help patrons locate products.

- Departmentalize. Create separate departments for like categories of inventory. For instance, **manyfarm** supply retail operations include departments such as hardware and hand tools, housewares, clothing, crop and livestock inputs, pet supplies, power equipment, fencing, and seasonal merchandise. Related items are more likely to sell in quantity when displayed near each other.

- Use open spaces. Create open areas to display floor and bulk merchandise. It allows store personnel to spot patrons who might need help, reduces pilferage, allows for effective display of certain inventory items, and makes the showroom look larger and more attractive. Gondolas should be placed on the sides or back of the showroom. The center showroom areas should be left open for floor and bulk displays. Avoid using unusually

high gondolas because they obscure the view of patrons, invite pilferage, darken inventory, and generally are unattractive. For openness, gondola height should be restricted to about 4 feet.

- Use store fixtures. This includes using compartmentalized shelving on gondolas, separating bulk loose commodities into separate containers in neat arrangements, using platforms for floor displays of bulk and big ticket items, and displaying promotional items on end caps.

- Limit the number of displays. Patrons often buy nothing if given too much to choose from.

- Allowing patrons to handle some products increases their will to own them.

- Change displays regularly, especially special sale displays usually included on end caps.

- Create special holiday displays—Christmas, New Year's Day, Easter, July 4th, Mother's Day, Father's Day, graduation, etc.

- Keep inventory clean and up-to-date.

Regularly check expiration dates on inventory such as animal health products.

#### *Signs—*

Signs increase sales. Signs should tell a story and highlight the price of merchandise.

Information on signs should be short and specific, describing only the major attributes of the product. Signs also should indicate sale items.

The use of signs can enliven a showroom, but should not distract from merchandise presentations. They should subtly draw attention and enhance the display with additional product information.

Signs should indicate if items are *on clearance*, *advertised items*, or *special buys*. Signs should also be developed as follows.

- Include price on signs. Pricing is often more effective when odd cents or multiples on clearance or special buy items are used—two for \$9.98 seems less costly than \$5 each.

- Limit the number of signs. Too many signs are worse than none. Sign clutter weakens communication.

- Display major signs at about the same level throughout the store (especially department signs).

- Use signs on all end caps (tables, etc.) displaying seasonal or promotional products. Signs should provide a brief description of items and their price. When an end cap has multiple products, a single sign should separately list individual items and their price.

### *Color and Lighting*–

Two important merchandising techniques often overlooked involve color and lighting. Color can help sell products. If the walls of a showroom are painted, the colors should make the store interior a showcase for every product carried. For instance, a light shade on walls and ceilings creates an illusion of spaciousness. Darker colors help camouflage objectionable areas (if there are some that can't be corrected). Use of color on certain product displays helps draw attention to merchandise. Color should be used for promoting sale items and for making attractive displays of seasonal or special merchandise.

Correct lighting is also essential. If possible, the showroom should not be uniformly illuminated. Lighting should be varied to attract attention to specific items and areas. Spotlights or colored lighting on special displays attract extra attention. But avoid being too extreme with lighting because too much bright lighting may cause eye discomfort.

**Product Promotion** A part of inventory management that can't be overlooked is product promotion. Advertising regular merchandise and special sales items are effective methods for selling merchandise faster than it would normally move. Use of advertising and holding sales are a must.

## **(10) Coordinate Inventory Between Multiple Branches**

Coordination of inventory between multiple branches of the cooperative is a typical problem. It takes full coordination of all inventory functions to effectively manage it. Strong coordination and communication among branches must include both the purchase and sale of inventory and associated services. When one branch is low on a particular

product and another has plenty in stock, merchandise can be quickly transferred. There is no need for one branch to reorder products when another branch has them.

That practice results in inefficient inventory management and higher inventory maintenance and order costs for the entire cooperative. The same sale would have been made had the inventory been transferred instead of reordered. However, different branches of the cooperative often compete with one another on sales. Competition can be healthy because it provides incentive for branch employees to work harder. But, it must never conflict with the ultimate inventory goal of the cooperative—overall effective inventory management.

## **Summary**

The inventory management plan (figure 1) defines a mission, sets broad goals, defines specific performance goals, implements strategies to reach goals, and includes a feedback loop to measure results. Specific strategies (concepts) make up the crux of the plan. Ten are described.

In summary, cooperatives must continually work to: (1) attain the correct inventory mix for the cooperative's members and patrons; (2) maintain efficient levels of inventory according to sales and member (patron) demand; (3) minimize the costs of inventory; (4) use organized and efficient methods for ordering inventory; (5) ensure that all employees with direct contact with inventory or inventory paperwork understand pricing, markup, and margin concepts; (6) frequently analyze inventory and related financial statistics and conduct periodic physical counts on inventory; (7) handle inventory merchandise like the actual dollars it represents; (8) merchandise the showroom and warehouse effectively and develop product promotion programs; and (10) coordinate inventory between various branches of the cooperative.

These interrelated strategies should be implemented as a system. For instance, attaining the correct inventory mix and maintaining efficient inventory levels are linked to minimizing costs

associated with maintaining inventory, ordering efficiently, tracking inventory performance, and making physical inventory counts. These strategies form a solid foundation of an inventory management plan.

## **STRATEGIC CONSIDERATIONS**

Local farm supply cooperatives need to fully assess the consequences of using particular inventory management strategies to serve members. Members' view and understanding on the role of their cooperative will often place pressure on inventory strategies. Many members expect their cooperative to always have what they need and when they need it.

However, competitors' strategic behavior can make this expectation unrealistic and costly. Cooperatives often need to alter their inventory strategies or **develop alternative** strategies in response to the competitive and financial consequences that result from their current plan.

### **Competitive Forces and Current Strategy**

Cooperatives face competitive pressure from other businesses. Often, farm supply cooperatives find themselves providing a market yardstick for the other businesses in their market environment.

In other words, proprietary firms within a cooperative's market will often tailor their inventory management strategies (e.g., prices, product lines, and inventory levels) to the cooperative's strategies. Cooperatives must be aware of their competitors' inventory management strategies and be prepared to change their inventory management plan if necessary.

Faced with a large chain competitor, the cooperative will likely experience some negative consequences if it continues following all of its employed inventory management strategies.

Strategies must be assessed as to their effectiveness, given the change in competitive environment. This involves evaluating the cooperative's inventory mix and pricing and promotion strategies. Large chain competitors are often able to sell

certain items as cheaply as local cooperatives can purchase them from their suppliers.

Cooperatives facing these circumstances must carefully evaluate their product lines and pricing practices and make the necessary changes to counteract any competitive pressures. Cooperatives must differentiate themselves from the chain(s) to retain patrons and sales volume.

### **Is the Cooperative Completely in the Business?**

If competitor proprietary stores (or other cooperatives) know that a cooperative carries only certain items of an inventory line, they can gain a competitive advantage by carrying the complete line.

The cooperative's strategic response to this situation should be either to carry and promote a comprehensive inventory line of a specific merchandise type or not to carry that line at all. The cooperative must demonstrate that it is seriously in the business of selling the particular merchandise line and fully intends to serve members (patrons) in that regard. Carrying odds and ends of a wide array of merchandise items to meet the random needs of select members is inefficient and says the cooperative is not seriously interested in meeting the needs of other patrons who regularly demand the entire line of such merchandise.

### **Differentiate as a Cooperative**

Perhaps the best strategy that a cooperative can use in response to competition is to promote its cooperative identity. This attribute, alone, differentiates the cooperative from proprietary firms. Cooperative identity must not only be promoted to members and farmer patrons but to other patrons as well. Patrons who are neither farmers nor members often enjoy the fact that a farm supply cooperative is a "farm" store owned by farmer members.

Promoting the farm store and cooperative message is particularly fitting when the cooperative is in an urban area. Constant attention and education are needed to get the full impact of coop-

erative differentiation. The concept must be continually promoted in newspapers, flyers, radio, using outside and in-store signs, etc. People need to be constantly reminded that the business is a cooperative farm store that provides a wide variety of needed merchandise lines and services.

**Specialization Among Multiple Branches** A farm supply cooperative with multiple branches in close proximity may benefit by specializing in certain product lines at different locations. For example, a cooperative may handle hunting supplies at each branch but find poor sales at all but one location.

Under this scenario, the cooperative would benefit by consolidating all hunting supplies at the location of greatest demand. With suitable promotion, members and patrons would know where to go for hunting supplies and be ensured of an adequate choice and supply of merchandise and assistance from a more knowledgeable sales staff.

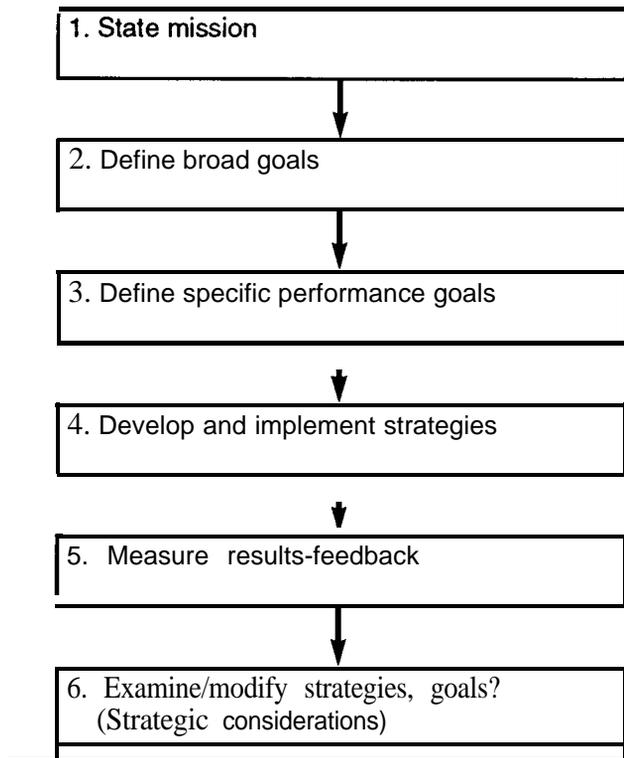
Product specialization among multiple branches is an inventory management strategy. Its potential success hinges on the type of merchandise in question and the logistics of supplying varied locations. This strategy can benefit cooperatives in certain instances but should be used only after careful evaluation of its implications.

## CONCLUSION

Many cooperative managers tend to rely on subjective judgement for inventory management rather than incorporate an array of specific goals and strategies in an explicit plan. While judgement honed from experience is in itself an effective inventory management tool, management of the cooperative's inventory can be enhanced through the use of a plan.

Steps to follow include stating a mission, defining broad and specific performance goals, developing and implementing inventory management strategies, measuring results, and examining and modifying strategies and/or goals as needed (figure 5). Inherent in plan development is the delegation of employee responsibility to carry it out.

**Figure 5 — Steps to Planning Inventory Management**



An inventory management plan can help cooperatives.

Once a plan is in place, cooperatives need to regularly assess the effectiveness of their overall inventory strategy design and counteract possible negative financial and competitive consequences. The implications that result from using inventory management strategies relative to serving members and achieving financial goals must be evaluated, given competitor presence and strategic behavior.

Cooperative managers may have developed their own inventory management strategies and/or found others in textbooks and other literature. Concepts in this report can serve as a checklist to identify features or components of an inventory management system that are lacking or may need improvement. The key task is to build an organized framework for working with inventory that fits within the cooperative's operations and provides for effective inventory management.

## REFERENCES

Beard, Larry H., Al L. Hargraves, and Fred A. Jacobs. "Managing Inventories in a Small Business," *Business Journal*, April 1983.

Brooks, Bruce L. "Inventory Management and Control in Agricultural Marketing and Supply Businesses," University of Illinois at Urbana-Champaign, College of Agriculture, Cooperative Extension Service Circular 1063, 1972.

Garrison, Ray H. *Managerial Accounting*, Third Edition, Business Publications, Inc.: Plano, Texas, 1982.

Grablowsky, B.J. "Financial Management of Inventory," *Journal of Small Business Management*, July 1984.

**Appendix table I--Selected financial data from sample of U.S. local farm supply cooperatives, 1990<sup>1</sup>**

Variable	Mean	Minimum	Maximum	Std. Dev.
<b>All cooperatives (n=139)</b>				
Beginning inventor	\$487,756	\$13,683	<b>\$4,726,885</b>	\$546,823
Ending inventory	\$520,773	\$8,558	<b>\$4,435,349</b>	\$548,630
Average inventor	\$504,264	\$11,121	\$4,581,117	\$544,473
Inventory/current assets	49.4%	14.9%	81.3%	14.0%
Inventory/total assets	25.2%	5.4%	57.7%	9.0%
Inventory turnover ratio <sup>2</sup>	7.68	2.63	21.46	<b>3.62/n</b>
Gross margin	18.2%	6.3%	30.7%	3.9%
Inventory management index <sup>3</sup>	1.37	0.45	4.67	0.67
Operating income/sales	2.7%	-4.9%	8.6%	2.7%
<b>Cooperatives with less than \$5 million sales (n=101)</b>				
Beginning inventory	\$297,312	\$13,683	<b>\$1,233,387</b>	\$202,606
Ending inventory	\$314,452	\$8,558	<b>\$1,369,385</b>	\$213,401
Average inventory	\$305,882	\$11,121	<b>\$1,301,386</b>	\$205,110
Inventory/current assets	49.5%	14.9%	81.3%	14.9%
Inventory/total assets	25.2%	5.4%	57.7%	9.4%
Inventory turnover ratio	7.57	2.63	21.46	3.60
Gross margin	17.7%	6.3%	30.7%	3.9%
Inventory management index	1.32	0.45	4.67	0.70
Operating income/sales	2.2%	-4.8%	8.6%	2.7%
<b>Cooperatives with sales of \$5 to \$10 million (n=31)</b>				
Beginning inventory	\$815,338	\$221,099	<b>\$1,747,313</b>	\$393,873
Ending inventory	\$901,093	\$235,487	<b>\$2,015,527</b>	\$406,926
Average inventory	\$858,215	\$228,293	<b>\$1,881,420</b>	\$386,783
Inventory/current assets	48.6%	28.4%	76.0%	10.7%
Inventory/total assets	24.1%	11.3%	44.6%	7.2%
Inventory turnover ratio	8.10	3.32	21.09	3.75
Gross margin	18.7%	10.6%	24.5%	3.2%
Inventory management index	1.46	0.66	2.61	0.55
Operating income/sales	4.4%	-0.6%	7.6%	2.0%
<b>Cooperatives with sales of \$10 to \$20 million (n=4)</b>				
Beginning inventory	<b>\$1,839,422</b>	<b>\$1,035,739</b>	<b>\$2,479,373</b>	\$735,612
Ending inventory	<b>\$1,779,090</b>	<b>\$1,110,133</b>	<b>\$2,251,930</b>	\$595,627
Average inventory	<b>\$1,809,256</b>	<b>\$1,072,936</b>	<b>\$2,365,652</b>	\$664,874
Inventory/current assets	51.6%	45.5%	62.8%	9.0%
Inventory/total assets	31.2%	21.9%	44.1%	11.6%
Inventory turnover ratio	6.84	4.32	9.98	2.88
Gross margin	22.0%	17.2%	27.8%	5.4%
Inventory management index	1.41	1.20	1.72	0.27
Operating income/sales	3.8%	0.7%	7.1%	3.2%
<b>Cooperatives with more than \$20 million sales (n=3)</b>				
Beginning inventory	<b>\$3,000,146</b>	<b>\$1,273,406</b>	<b>\$4,726,885</b>	<b>\$2,441,978</b>
Ending inventory	<b>\$3,157,529</b>	<b>\$1,879,708</b>	<b>\$4,435,349</b>	<b>\$1,807,111</b>
Average inventory	<b>\$3,078,837</b>	<b>\$1,156,557</b>	<b>\$4,581,117</b>	<b>\$2,124,545</b>
Inventory/current assets	49.4%	31.0%	67.9%	26.1%
Inventory/total assets	33.0%	23.0%	43.1%	14.2%
Inventory turnover ratio	8.04	3.94	12.14	5.80
Gross margin	24.5%	22.2%	26.7%	3.2%
Inventory management index	2.06	0.87	3.24	1.67
Operating income/sales	3.0%	-0.4%	6.4%	4.7%

<sup>1</sup> Source: U.S. Department of Agriculture, ACS farmer cooperative supplies and services data base.

<sup>2</sup> Inventory turnover ratio = average inventory ÷ cost of goods sold; average inventory = (beginning inventory + ending inventory) ÷ 2.

<sup>3</sup> Inventory management index = inventory turnover x gross margin percent.

**U.S. Department of Agriculture  
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Cooperative Services (1 ) helps farmers and other rural residents develop cooperatives to obtain supplies and services at lower cost and to get better prices for products they sell; (2) advises rural residents on developing existing resources through cooperative action to enhance rural living; (3) helps cooperatives improve services and operating efficiency; (4) informs members, directors, employees, and the public on how cooperatives work and benefit their members and their communities; and (5) encourages international cooperative programs.

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