Universal Product Code Scanning Applied to Meats: An Overview

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Introduction

Universal Product Code (UPC) scanning of meats in supermarkets, coupled with related computer technologies, has the potential to dramatically alter and improve meat operations from supermarkets back to cattle and hog production activities on ranches and farms.

The significance of UPC scanning to shoppers, retailers, packers and processors, as well as to feeders and producers, can best be described by following three questions addressed in this paper:

- Why the need for scanning and related technologies applied to meats?
- What is meat scanning and what can it do?
- What is the status of UPC scanning in meat operations?

Why the Need for Scanning and Related Technologies Applied to Meats?

These new technologies are vitally important to the future prosperity of the meat industry for two fundamental reasons. The first relates to the pressing need for improved productivity and cost reduction. The second relates to management decision-making and the need for more precise information for important day-to-day as well as long-term meat operations.

Supermarket meat departments are costly to operate in terms of both labor and capital, as meat departments are, in fact, factories within supermarkets. Wage rates for meat department employees are generally higher than for other supermarket employees, and training and skill requirements are generally higher. Moreover, equipment and supply costs are greater than for other departments.

Despite current wage and benefit freezes, "give-backs" and the weakened position of unions, the long-term pressure from rising costs associated with wages, fringes, work rules, equipment, utilities and supplies will accelerate the adoption of scanning and related computer technology. One industry executive stated: "The costs of meat operations have nowhere to go but up." Increasingly, industry leaders realize that ways must be found to increase productivity in order to keep prices of meat products competitive with food alternatives.

There is another set of reasons that helps to explain why this technology needs to be applied. Meat operations need better and more precise information for improved management decisions. Specifically, retail meat operators need the following kinds of information:

- Accurate information on costs of individual retail cuts.
- Timely and reliable information on dollar and unit sales.
- Magnitudes and causes of meat losses due to "shrink," "pulls" and "rewraps."
- Accurate information on *net* profits for meat departments, as well as for individual retail meat cuts.

Increasingly, detailed and reliable information of this kind is available and is being used by managers of other supermarket departments; and leading companies are recognizing the necessity for sound meat department operations. UPC scanning is seen, then, as a feasible way to bring greater precision to meat operations. As one executive said: "Scanning will strip away the "black box" from meat departments which until now have been managed by 'seat-of-the-pants,' traditional operators."

What Is Meat Scanning and What Can It Do?

First of all, it is useful to differentiate between standard-weight grocery product scanning and variable-weight meat scanning. The supermarket industry has had grocery product scanning since the mid-1970's and this technology is now in use on virtually all standard-weight items from food manufacturers that arrive at supermarkets with UPC labels (source-labeled). The UPC labels on cans of Green Giant peas fully identify these standard-weight products. Laser scanners at supermarket check-outs read UPC codes to identify the manufacturer and the specific product. An associated computer, in which UPC-labeled item prices are stored, relays prices back to the cash register. In contrast, meat cuts which are packaged and labeled in backrooms are variable in weight and, unlike canned peas, are not standard-weight items. Therefore, UPC symbols on store-wrapped meats also include information on the *price* of items, as well as identifying particular meat cuts. Thus, variable-weight scanning is much more complex than standard-weight grocery product

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scanning. This complexity has been a primary factor responsible for the lag in development and adoption of meat scanning systems and other variable-weight categories such as produce, cheese, bakery and deli.

Meat Scanning Systems – From Processors to Supermarket Check-Outs

Scanning and related technology can be applied to each stage in the flow of products through the meat distribution system – from packers and processors to wholesale distribution centers, supermarket receiving docks, retail meat storage coolers, backroom cutting operations, fresh meat cases and finally supermarket check-outs. Scanning applications to each of these stages are described below:

Packers and processors to wholesale distribution centers. Shipping containers of boxed beef, pork, lamb and veal are labeled by processors with scannable codes. These labels which describe product contents, although different in composition from the retail item UPC code, are capable of being read by a laser scanner. Thus, boxes are scanned and documented as they enter and leave wholesale distribution centers, achieving effective inventory record keeping via coding and scanning.

Supermarket receiving docks. As cartons of product move from the wholesale level into supermarkets, they are weighed and recorded as retail managers initiate store-level activities at supermarket receiving docks. From this point on, in-store mini-computers maintain inventories of each meat item.

Retail meat storage coolers. Meat, still in boxes, moves from the receiving stage into backroom storage coolers prior to backroom fabricating operations. As boxes or items are removed, it is a simple matter to maintain accurate cooler inventory. Thus, a constant, reliable, up-to-date storage cooler inventory can be achieved with cost-effective use of labor and equipment. This can be done manually or by utilizing handheld programmable computer scanners.

Backroom cutting operations. Once product is brought into the backroom for fabrication, it is again weighed as it is removed from vacuum bags or other packaging. From this point on, scanning technology facilitates tracking the movement of every cut fabricated in the backroom and displayed in the retail case. Fat, bone, labor applied, packaging materials as well as rewraps, mark-downs and sale items also can be accurately measured on a cost-effective basis by new wrapping and labeling equipment possessing micro-processing capabilities.

Fresh meat cases. Using the hand-held computer technology referred to above, it is possible to scan products in meat cases on a daily or weekly basis for timely retail case inventories for accounting purposes as well as merchandising management.

Supermarket check-outs. Finally, to close the meat management information loop, meat cuts with UPC labels are scanned as shoppers check out at the conclusion of their shopping trip. At this point in the system, it is possible to know precisely what was sold, when it was sold and under what merchandising circumstances – displays, sales, ads, etc.

Scanning's Potential for Improved Operations

The overall significance of scanning and related technologies is that the potential now exists for improved meat operations information to facilitate decision-making throughout the entire wholesaling and retailing system. More accurate, timely and detailed information will provide the basis for meat department managers, meat directors, packers and processors, and ultimately producers, to better serve the needs of their customers as well as supermarket shoppers. Thus, scanning and its associated technology provides meat operators with vitally important tools for improved meat operations; however, it should be recognized that these beneficial new technologies remain at this point in time a *potential*. Implementation has just begun; and accelerated adoption will require significant change in industry attitudes and practices. Moreover, scanning and its related technology necessitates a higher order of management capability.

It also should be noted that the adoption of UPC scanning technology does not eliminate the need to perform traditional management functions. Instead, scanning requires operational discipline and permits traditional functions to be accomplished in a cost-effective manner. It ensures correct procedures and thereby greatly reduces the incidence of human error. For example, the performance of cutting tests – a traditional function – becomes an essential component in a scanning system requiring proper procedures. In light of current practice, this will be a monumental step forward.

Specifically, scanning systems applied to meat operations can contribute to operations in the following areas:

Improved merchandising programs. Scanning technology is bringing more precise answers to such questions as: What items should be featured? What is an optimum layout for the case? How much variety can be provided on a profitable basis?

Improved inventory balance. Recorded-item sales over time, correlated with merchandising conditions, can be the basis for accurate sales forecasts, thereby alleviating traditional problems of out-of-stock, as well as excessive inventory.

Greater labor productivity. With improved merchandising and better inventory balance, it also is possible to more effectively schedule labor; that is, having personnel working when they are needed, and doing what is most profitable on behalf of the meat department.

Improved product mix. The new technology will permit effective merchandising fine tuning in terms of: displaying beef vs. poultry; roasts vs. steaks; small packages vs. large ones – on a store-by-store basis. Such decisions can be based substantially on what the scanning data show shoppers want under particular merchandising and pricing situations.

Improved operating results. In terms of the ultimate profitability of meat department operations, it is likely that by better meeting shoppers' needs, meat departments will be able to attract more shoppers. More satisfied shoppers, coupled with improved management of meat operations, should result in stronger profitability of those meat operations which adopt these technologies.

What is the Status of UPC Scanning in Meat Operations?

Progress with respect to the implementation of computer technologies applied to retail meat operations has been influenced by a number of factors. Meat scanning technology has existed for most of the last decade, during which time a small number of company and association executives have advocated its use with great enthusiasm, but with limited success. It was not until the last several years that the following developments occurred which created wide-spread interest in meat scanning: cost-effective in-store mini-computer technology coupled with thermal-print UPC labeling equipment; growing industry recognition of the need for scanning applied to meats; meat operations software programs; and the creation of an industry-wide UPC meat code system. Given this impetus, it now seems certain that by the end of this decade, UPC scanning of meats will be commonly accepted as an indispensable component of effective supermarket meat operations management.

Availability of Workable Retail Backroom Equipment

In-store mini-computer technology designed to store and access various components of key information – receiving, storing, fabricating, packaging and displaying – has in recent years become increasingly "user-friendly," as well as more cost-effective. Moreover, critically important meat-item UPC labels, which convey essential information needed throughout retail meat operations, have been vastly improved by equipment suppliers. Thermal-print labels have proven to be scannable at acceptable levels for most operators, thereby overcoming perhaps the most important barrier to meat scanning adoption. This advance in technology has improved scan rates from 30% to 70% to over 90%. Furthermore, label printers, as integrated parts of modern electronic scale systems, possessing microprocessor computer capacity, may in the near future have the capability of printing labels containing much-needed detailed consumer information:

- Nutrient, caloric, cholesterol content per item or serving.
- Recipes for microwave and conventional cooking.
- In-home storage, preparation and serving instructions.
- Information to enable shoppers to more effectively determine the economic value of each item, such as number of servings per package and the price per serving.

Wide-Spread Industry Recognition of the Need for UPC Scanning

To demonstrate the growing retailer awareness of operating and merchandising potentials for the application of UPC scanning to meat operations, the following anecdote is instructive. In 1980, we surveyed a broad sample of retail industry meat directors. In virtually every interview, executives in response to questions concerning the potential application of scanning expressed the opinion that the technology would play no significant role within the foreseeable future. However, as a result of the growing number of meat industry trade association presentations and marketing initiatives on the part of electronic scale and label printer manufacturers, meat industry executives experienced dramatic changes in their attitudes toward the technology. Consequently, one year later the National Live Stock and Meat Board (NLSMB) and the Food Marketing Institute (FMI) initiated a jointly-sponsored series of two-day meat scanning management seminars devoted to instructing retail and wholesale meat executives, as well as data processing executives. Approximately 450 executives, representing most major U.S. retailers as well as many smaller chain and independent operators, have attended these seminars to date. Thus, the exposure of this technology is now broad-based in terms of types of organizations and their geographical distribution. These seminars (FMI/NLSMB Scanning Strategies Series: Meat Operations) focused on the potential benefits of scanning applications, the kinds of management reports that are possible, techniques of computerizing existing meat operations such as cutting tests, and alternative ways companies can organize and initiate meat scanning activities. Subsequently, an advanced seminar has been introduced as a companion course to assist companies which have progressed beyond the initial adoption phases of scanning.

It should be noted that in the two and one-half years since the initiation of these seminars only a small number of firms have developed full-scale scanning systems. However, dozens of firms have at least established strategic plans to develop meat operations systems. Therefore, it seems likely that by the end of the '80s several firms will have developed advanced meat scanning systems.

Computer Software Development: Programs Designed for Retailers' Meat Scanning Needs

Prior to 1983, wholesalers and retailers who initiated steps to adopt scanning to meat operations were inhibited by a lack of software programs suitable for meat operations. Thus, companies interested in implementing scanning lacked "turn key" technology necessary to facilitate adoption. However, this significant barrier to widespread adoption of meat scanning has been largely eliminated by the recent emergence of several software packages which are now available from software vendors and equipment manufacturers. At the 1984 FMI annual convention, for instance, approximately six firms displayed software packages for meat operations, enabling wholesalers and retailers to acquire what comes close to being "turn key" systems.

Toward an Industry-Wide Numbering System for Assigning Retail Meat Codes

UPC scanning emerged as a technology on the food distribution scene in the mid-1970's. Although provision was made in the overall UPC scanning program for variable-weight food products such as meats, poultry, fish, produce and cheese, a substantially different kind of (and more complex) numbering system remained to be developed.

Until the 1980's, UPC scanning applied to fresh meats was given little attention by the principal administrative organization designated by the food industry to oversee the management and implementation of the UPC code and symbol, the Uniform Product Code Council (UPCC). Howev-

er, the UPCC is now considering the 1984 proposal for a system of fresh and frozen random-weight red meat codes which has been recently formulated by the Meat Industry UPC Random Weight Ad Hoc Committee. This latter committee was formed in 1983 and is composed of representatives from leading wholesalers and retailers, meat packers, equipment suppliers, major trade associations, the National Live Stock & Meat Board and university researchers. The FMI serves as the coordinating organization of the committee.

At this writing, acceptance by the UPCC of this proposal seems assured. The proposed code structure from the Meat Industry UPC Random Weight Ad Hoc Committee is presented in Appendix #1. The committee operated under the following guidelines in formulating the proposed structure for assigning meat cut codes.

- The proposal would satisfy the requirement of the overall food industry UPC structure by meeting the requirements of the UPC "Guideline #11," which is that part of the total UPC system designated for random-weight meats, as well as for other random-weight foods sold through retail stores.
- The proposed system would apply only to the fresh and frozen consumer meat items that are *wrapped and labeled at the retail store level*. Thus, the proposed system is not designed to fully accommodate the emerging trend of the production and sale of packer/processor variable-weight case-ready meat items – a likely eventuality, for which a new or modified system must be designed.
- To ensure uniform industry meat cut identity, code numbers are based upon the NLSMB's "Uniform Retail Meat Identity Standards" program. The maintenance and updating of this program is in the province of the Industry-Wide Cooperative Meat Identification Standard Committee (ICMISC), which was established in the early 1970's.
- It is recognized that the recommended system must be flexible and accommodate the growth of fresh and frozen meat products, as well as adjust to substantial changes in meat processing and distribution which seem certain to occur.
- The NLSMB will serve as the clearing center for UPC meat item numbers, and the Uniform Product Code Council has the responsibility to approve and maintain the overall numbering system for variable-weight meat items, as well as other variable-weight foods.

The proposed industry-wide numbering system will permit operators to capture data on individual retail cuts. The proposed numbering scheme identifies the major primals for each red meat species – beef, pork, lamb and veal. Blocks of numbers in sequence have been assigned for each species, with consecutive numbers for each item within the primal. Provision has been made for wholesalers and retailers to assign numbers to cuts resulting from unique merchandising situations at the end of the block of numbers assigned to each species.

The proposed numbering scheme has capacity to accommodate modest growth in the number of items. It is probable, however, that adjustments in the numbering scheme will at some future time be necessary due to continuing changes in meat marketing. One possible modification might be to abandon sequential numbering as the growth of new items exceeds the reserve spaces designated by "retailer assigned" blocks of numbers. It is reasoned that advances in computer technology will diminish the need expressed by wholesalers and retailers for a sequential numbering structure. Many meat executives believe that under current store level operation modes, sequential numbering is important to avoid confusion and errors by backroom meat operators. Therefore, one of the important tasks of the Meat Industry UPC Random Weight Ad Hoc Committee and the Uniform Product Code Council is to anticipate likely changes in meat industry practices and to formulate plans to adjust scanning systems to accommodate future changes.

Implications of UPC Scanning for the Meat System

There are certain to be important implications of a total data capture system for meats. What might be accomplished by the meat industry when meat cuts can be followed by means of UPC scanning technologies from packers and processors through the entire distribution system?

Answers to such a basic question as this will depend upon the professional capabilities of meat industry executives and university researchers to leverage computer-based technology to its optimum. It is believed by some meat industry operators that the following areas of meat operations can be greatly improved:

- To facilitate and accelerate needed meat product development by enhanced understanding of what it is consumers want and are willing to pay for.
- To develop more effective pricing mechanisms to provide appropriate economic incentives for the industry to produce products more in keeping with marketplace needs.
- The uniquely powerful information and communication capabilities of UPC scanning and related computer technologies will ultimately help overcome the highly fragmented and uncoordinated character of the meat system.

APPENDIX I

FINAL PROPOSAL

SCANNING STRATEGY APPLICATION DEVELOPMENT GUIDELINE STRUCTURE FOR ASSIGNING RETAIL MEAT CODES

Number System Character	Retailer Assigned	ITEM ID			Check	Price
		Family/Class		X_2 X_3 X_4 X_5		
2	X_1				X_6	X_7 X_8 X_9 X_{10}
	Rewraps Special Sales, Packer/ Processor	**BEEF (1000-1849)**	Carcass	1 0 0 0 - 1009		
			Chuck	1 0 1 0 - 1167		
			Rib	1 1 6 8 - 1267		
			Loin	1 2 6 8 - 1425		
			Round	1 4 2 6 - 1565		
			Shank	1 5 6 6 - 1581		
			Brisket	1 5 8 2 - 1597		
			Plate	1 5 9 8 - 1621		
			Flank	1 6 2 2 - 1633		
			Gr. Beef	1 6 3 4 - 1703		
			Misc.	1 7 0 4 - 1763		
			Variety	1 7 6 4 - 1799		
		Retailer	Assigned	1 8 0 0 - 1849		

BEEF (1850-2699) – Replicate as above for additional grade ID

			Fresh	Frozen
VEAL (2700-2969)				
	Carcass	2 7 0 0 - 2702		2835-2837
	Shoulder	2 7 0 3 - 2722		2838-2857
	Rib	2 7 2 3 - 2734		2858-2869
	Loin	2 7 3 5 - 2746		2870-2881
	Leg	2 7 4 7 - 2776		2882-2911
	Gr. Veal	2 7 7 7 - 2781		2912-2916
	Misc.	2 7 8 2 - 2801		2917-2936
	Variety	2 8 0 2 - 2821		2937-2956
Retailer	Assigned	2 8 2 2 - 2834		2957-2969

			Fresh	Frozen
LAMB (2970-3169)				
	Carcass	2 9 7 0 - 2972		3070-3072
	Shoulder	2 9 7 3 - 2992		3073-3092
	Rib	2 9 9 3 - 3002		3093-3102
	Loin	3 0 0 3 - 3012		3103-3112
	Leg	3 0 1 3 - 3027		3113-3127
	Gr. Lamb	3 0 2 8 - 3032		3128-3132
	Misc.	3 0 3 3 - 3047		3133-3147
	Variety	3 0 4 8 - 3057		3148-3157
Retailer	Assigned	3 0 5 8 - 3069		3158-3169

			Fresh	Smoked
PORK (3170-3999)				
	Carcass	3 1 7 0 - 3172		—
	Shoulder	3 1 7 3 - 3222		3585-3620
	Loin	3 2 2 3 - 3392		3621-3680
	Leg (Fresh Ham)	3 3 9 3 - 3420		3681-3900
	Side/Bacon	3 4 2 1 - 3426		3901-3940
	Gr. Pork	3 4 2 7 - 3468		—
	Misc.	3 4 6 9 - 3533		3941-3970
	Variety	3 5 3 4 - 3548		—
Retailer	Assigned	3 5 4 9 - 3584		3971-3999

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Discussion

D.L. Huffman: I think you made an excellent presentation. I just wonder if you would care to comment on the other 50% of the meat industry. Those of us who work with the foodservice industry, of course, are more readily identifiable with IPMS and NAMPS standards which are already confusing. I wonder if you have given any thought to trying to incorporate some kind of coding system where we can follow the entire meat industry rather than just one portion of it.

J.W. Allen: All the way through foodservice for example, which accounts for perhaps 35% to 40% of the red meats that are marketed? That is a very good question. Tom, do you know whether any discussion has been made of that?

Tom Pearson: I wonder if the shipping container coding system that we have will not be used right from the packing plants. In foodservice, we certainly add a lot more value to the products. They are frequently close to final form when they leave the packing plant. On Monday we went to Fort Worth and spent a day with the people at Standard Meats. What they are doing in terms of value-added product for those HRI users is phenomenal. We really do think that the retail industry has a lot to learn from the HRI industry. I think we are going to be able to track those products through the system as well. One of the reasons I think we should be concerned about a uniform coding system is so that we can police things in a meaningful way. Ken, do you want to comment on that?

H.K. Johnson: With regard to a plan of action, Dale, what we felt was, let's get the retail cuts identified and get that system completed and recognized by the industry. Then the next step would be, and it is planned down the road, to start looking at primal and subprimals and tying in with the IMP and NAMP numbers. Eventually we will have a total system.