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Scott Fausti

South Dakota State University

Steve Schamber

South Dakota State University

Dwight Adamson

South Dakota State University

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A DISCUSSION OF THE ISSUES

by

S.W. Fausti, D.M. Feuz and
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VALUE BASED MARKETING FOR FED CATTLE: A DISCUSSION OF THE ISSUES

BY

S.W. FAUSTI, D.M. FEUZ, J.J. WAGNER

INTRODUCTION:

Beef demand in the United States began to weaken relative to the demand for pork and poultry in the 1970s. The literature offers two possible explanations: 1) the lifestyles explanation; and 2) the relative-price explanation. Barkema and Drabenstott (1990) review the literature concerning the market share issue and concisely outline the two possible explanations: "The lifestyle argument suggests that consumers chose to eat less beef due to health concerns and changes in lifestyles. The relative-prices explanation suggests consumers switched from beef to poultry because beef became relatively more expensive than poultry."

The issue of improving beef's competitiveness against other domestic meat products and foreign imports has been discussed widely by groups associated with the beef industry. One possible strategy that has been seriously considered is a new Value Based Marketing System (VBMS) for finished cattle. This strategy is articulated in the Value Based Marketing Task Force final report (1990), published by the National Cattlemen's Beef Association (NCBA). Based on the report's findings, the task force gave a strong recommendation for the development of a new marketing system (application of discounts and premiums beyond dressed weight & grade) that will encourage producers to raise leaner cattle that still will grade USDA low choice or higher. In turn, leaner cattle will reduce revenue loss due to fat (estimated at \$2 billion per year) and increase consumption of leaner beef by fat conscious consumers. Thus, a new VBMS (beyond dressed weight & grade) will address both the lifestyle and relative-price dilemmas.

The NCBA report and recent articles in the animal science literature (Cross and Whittaker

1992, Cross and Savell 1994) clearly implicate current cash marketing alternatives for fed cattle as a major obstacle to improving beef's competitive position in the domestic market. This view is articulated in the NCBA report (Consensus point 7): "Fed cattle should be valued on an individual carcass basis rather than an average live price." Proponents of a new VBMS argue that the current multiple alternative cash marketing system for fed cattle (live; dressed weight; dressed weight & grade) is a barrier to the transmission of consumer preferences for a particular type of beef product to the fed cattle producer. The barrier arises because cattle are sold on a lot basis, and this implies that above-average cattle in the lot are paid less than their market value and below-average cattle in the lot are paid more than their market value. Thus, the price discovery mechanism fails because information to the producer on individual animal market value is not provided or is distorted.

The National Cattlemen's Beef Association and the animal science literature are providing strong support for the VBM concept for the fed cattle cash market. Their support is the catalyst for current research efforts at the University of Illinois U-C to develop an instrument grading system (consensus point 6 in the report). In theory, an instrument-based VBMS will allow USDA inspectors to estimate quality and yield grades more accurately. The proponents of a new system assert that once a new instrument grading system has been perfected, implementation of a VBMS in the fed cattle market will become feasible (see Cross and Savell 1994).

The economic literature on price discovery (Ward 1987; Feuz et al. 1993) suggests that the implementation of a new premium and discount pricing system beyond the current dressed weight & grade pricing system will increase per-head revenue variability. The increase in price variability will result from the packer being able to price discriminate to a greater degree with respect to overall cattle quality under a VBMS as compared to the current marketing alternatives.

The price discovery literature also suggest that fed cattle producers will react negatively to increased price-per-head variability under a new VBMS. If the price discovery literature is correct,

then a new VBMS will have a difficult time supplanting the three current cash marketing alternatives.

The discussion will begin with an overview of the current structure of the cash market for fed cattle. Next, the concept of VBM will be discussed and compared to the dressed weight & grade system. The price discovery literature then will be reviewed. Finally, per-head revenue will be calculated under a hypothetical VBMS and compared to the dressed weight & grade system using data from the South Dakota Retained Ownership Program (Wagner et al. 1991-95).

VBM AND STRUCTURE OF THE CASH MARKET FOR SLAUGHTER CATTLE

The beef industry is unique among the livestock and poultry industries in that there are a number of different management and marketing alternatives available to move product from producer to consumer. Cattle are raised in all regions of the country. Several feeding alternatives are available to raise calves to an appropriate harvest (slaughter) weight at the desired stage of maturity. Once the cattle are ready for harvest, producers also have a choice of marketing or pricing methods. This production and marketing system is complicated relative to other livestock and poultry production and marketing systems. A schematic of some of the present feeding and marketing alternatives is displayed in Figure 1. Sales can and often do occur between each of the feeding alternatives.

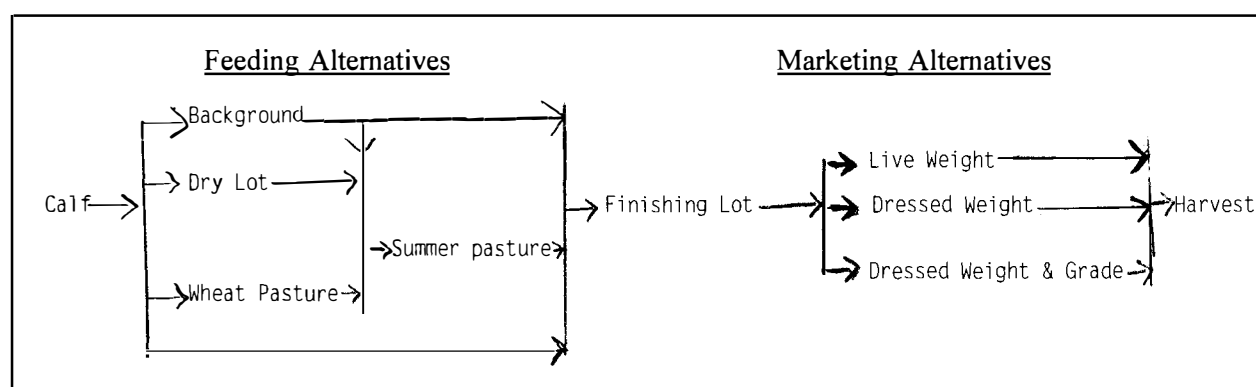


Figure 1. Alternative Feeding Programs and Slaughter Cattle Marketing Methods.

The VBM literature asserts that beef production and marketing channels contribute to

inconsistent product quality. There are a number of factors associated with the issue of inconsistent slaughter cattle quality: 1) the variability in production methods used to raise animals to slaughter weight; 2) the genetic diversity of the national herd; and 3) the current cash marketing system.

With respect to the current multiple cash marketing system Feuz et al. (1993) reported that the most important variable in explaining profit variability when cattle were sold live weight was average daily gain. However, when slaughter cattle were sold dressed weight & grade, quality grade became the most important variable explaining the variation in profit.¹ The implication of this study is that the selection of a cash marketing system determines which production variables will be rewarded. In turn, this reward signal will be incorporated into the producer's livestock management plan.

The supporters of VBM argue that it will reduce beef quality inconsistency and strengthen demand for beef by sending consistent reward signals to beef producers. However, the proponents of VBM have ignored the economic forces which have shaped the current structure of the cash market for fed cattle. For example, the Feuz et al. study does indicate that the dressed weight & grade system rewards quality cattle. However, according to the Packers and Stockyard Administration's 1992 report (Packers and Stockyards Statistical Report: 1990 reporting year, pp. 21-24), in the U.S. during 1990, 39.9% of steers/heifers and 38.1% of cattle (steers, heifers, bulls, and cows) were purchased on a carcass basis (dressed weight or dressed weight & grade). The proportion of carcass-basis purchases increased from 27.4% in 1980 to 38.1% in 1990. The PSA statistics can be used to infer that a carcass-basis marketing alternative to live weight has had limited success in attracting producers. The issue of why the dressed weight & grade system has failed to supplant the other cash alternatives has

¹ Adjusted R² for the live profit regression equation was .93. The coefficient of separate determination for average daily gain in the live weight profit model was .486, days on feed was .309, dressing percentage was -.0034, and quality grade was only .0068. Adjusted R² for the dressed weight & grade profit regression equation was .94. The coefficient of separate determination for quality grade in the dressed weight & grade profit model was .334, dressing percentage was .1937, days on feed was .120, and average daily gain was .264.

not been adequately addressed and is a serious oversight in the VBM literature.

The VBM literature argues that the current three marketing alternatives are flawed and partially responsible for beef's declining market share, that live and dressed weight alternatives are inadequate systems because of average pricing, and while the dressed weight & grade alternative is value based, it is also a barrier because it is unpopular among producers (see consensus point 7 in the NCBA report). The NCBA report argues that the dressed weight & grade alternative has been rejected by the majority of producers because: 1) humans grade the carcass; and 2) there is a time lag between the sale of an animal and payment for the animal associated with the dressed weight & grade marketing alternative. The validity of this assertion will be discussed within the context of the price discovery literature.

THE CONCEPT OF VBM

Currently, the USDA beef grading system is two dimensional: quality grade and yield grade. Carcass quality grades of finished cattle are divided into four categories: *prime, choice, select, and standard*, determined by animal maturity and degree of marbling (percentage fat content). Marbling is the primary factor determining quality grade: the higher the intra muscular fat content, the higher the quality grade. Carcass yield grades of finished cattle are divided into five categories: *yield grade 1 to yield grade 5*. Yield grade refers to the percentage of the carcass suitable for boneless retail cuts. The higher the percentage, the lower the numeric value assigned as the yield grade.²

In the cash market for fed cattle, the dressed weight & grade system is the only widely used value based system. Under the current grading system, there are 20 possible outcomes for a particular

² For an in-depth discussion of the grading system and how it relates to determining the value of finished cattle see Thonney (1990).

animal's grade as shown in table 1.³ The dressed weight & grade base price, premiums, and discounts are derived from the AMS grid system presented in table 2.⁴ This was done so that prices across systems are consistent for empirical analysis.

Table 1. Dressed Weight and Grade System

Quality Grade	Yield Grade				
	1	2	3	4	5
Prime	110	110	110	87.50	87.50
Choice	110	110	110	87.50	87.50
Select	106	106	106	83.50	83.50
Standard	100	100	100	77.50	77.50

When cattle are marketed under the dressed weight & grade system, packers set a base price. That base price is determined by market forces for cattle that meet minimum yield and quality grades. In table 1, it is assumed that in the cash market for finished cattle this minimum is quality grade *choice* and yield grade 3. For all practical purposes, all animals that meet the minimum grade receive the base price and no premium is given when animals exceed the minimum.⁵ For those animals that fail to meet the minimum, discounts are applied. For a majority of animals marketed dressed weight

³ We are ignoring animals that quality grade commercial or lower. The number of federally inspected animals grading commercial or lower is insignificant relative to all cattle federally inspected.

⁴ The basis price for the AMS grid system is set at \$110.00 for all animals meeting the following criteria: 1) weighing 700 to 900 pounds; 2) quality grade choice; and 3) yield grade (YG) 3.5 to 4.0. For the dressed weight & grade system the basis price is also set at \$110.00. The dressed weight & grade price system is derived by eliminating the weight discounts, collapsing the yield categories, and averaging the yield category prices under the AMS grid system.

⁵ There are exceptions to this rule of thumb. Packers will negotiate with producers to incorporate premiums into a formula-based sales agreement. However, it is not common practice.

& grade, the system is a value based system of discounts only.⁶ This particular characteristic of the dressed weight & grade system is considered a serious deficiency by many producers.

The explicit goal of the VBM initiative is to develop a marketing system that incorporates a greater range of premiums and discounts than what currently exists under the dressed weight & grade system. There have been several designs proposed, commonly referred to as grid systems.⁷ The grid system discussed here is three-dimensional and was developed by the Agricultural Marketing Service (AMS 1996) division of the USDA.⁸ The proposed AMS grid system is based on the current grid system used in the hog industry. This proposed system expands the yield categories from five under the dressed weight & grade system to seven. It also adds an additional dimension: weight class, divided into three weight class categories.

The base price of the AMS grid system (presented below) is set at \$110.00, and premiums and discounts are incorporated according to an animal's yield, quality, and weight classification (see footnote 4). There are 70 possible outcomes for a particular animal's grid rating, as shown in table 2 below.

⁶ Support for this assumption is provided in the empirical section of the paper.

⁷ At the present time, grid pricing arrangements are being offered to slaughter cattle suppliers by Beef America, Monfort, and Excel Co. The common link between these systems is the addition of premiums and a disaggregation of the discounts as compared to the dressed weight & grade system. However, there is no industry standard in place at this time.

⁸ The AMS presented its beef grid system at the 1996 national convention of the NCBA.

Table 2. Prices from AMS Grid System

	YIELD GRADE							
QUALITY GRADE	Less than YG 2.0	Greater than YG 2.0	Greater than YG 2.5	Greater than YG 3.0	Greater than YG 3.5	Greater than YG 4.0	Greater than YG 5.0	CARCASS WEIGHT
Prime	\$119	\$118	\$117	\$116	\$115	\$ 95	\$ 90	Less than 900 lbs.
Choice	\$114	\$113	\$112	\$111	\$110	\$ 90	\$ 85	
Select	\$110	\$109	\$108	\$107	\$106	\$ 86	\$ 81	
Standard	\$104	\$103	\$102	\$101	\$100	\$ 80	\$ 75	
Choice	\$111	\$110	\$109	\$108	\$107	\$ 87	\$ 82	900-950 lbs.
Select	\$107	\$106	\$105	\$104	\$103	\$ 83	\$ 78	
Standard	\$101	\$100	\$ 99	\$ 98	\$ 97	\$ 77	\$ 72	
Choice	\$ 96	\$ 95	\$ 94	\$ 93	\$ 92	\$ 72	\$ 67	Greater than 950 lbs.
Select	\$ 92	\$ 91	\$ 90	\$ 89	\$ 88	\$ 68	\$ 63	
Standard	\$ 86	\$ 85	\$ 84	\$ 83	\$ 82	\$ 62	\$ 57	

In comparing table 1 to table 2, it is clear that the AMS system differentiates with respect to price to a much greater degree than the dressed weight & grade system, an attribute characteristic of all grid systems relative to the dressed weight & grade system. The economic implication is that a grid system will increase the revenue per head variability relative to the dressed weight & grade system. According to the price discovery literature, increased revenue variability may be a barrier to successful implementation of a new VBMS.

PRICE DISCOVERY LITERATURE

Ward (1987) compares and contrasts the three marketing alternatives and the price discovery process associated with each alternative. Ward concludes that informational disparities concerning carcass quality and quantity (dressing percentage) among the three alternatives will lead buyers of finished cattle to adjust their bids to compensate themselves for incurring increased risk when purchasing cattle without full information on the quality and quantity of the carcass.

Ward's article has stimulated recent research on the economic consequences of informational

disparities between marketing alternatives. Feuz et al. (1993) indicated that there are profit differentials between marketing alternatives. Dressed weight & grade generates, on average, the highest profit. Live weight generates, on average, the lowest profit for producers of finished cattle. They hypothesize that risk aversion on the part of buyers (meatpackers) is the cause of the profit differentials.

Feuz et al. (1995) extended their earlier paper by deriving risk aversion coefficients for buyers of finished cattle and concluded that packers are risk averse. They also provided estimates of the average risk premiums charged by cattle buyers when they purchase cattle live or dressed weight. They reported that the coefficient of variation increases as sellers move from the live to dressed weight to the dressed weight & grade marketing alternatives. They hypothesized that the coexistence of the three marketing alternatives with revenue differentials between the alternatives is the result of risk aversion varying among cattle producers. The most risk averse producer sells cattle via the live alternative and the least risk averse producer sells cattle dressed weight & grade.

Fausti and Feuz (1995) developed a theoretical model of a competitive firm in the meatpacking industry purchasing finished cattle via the three marketing alternatives. Their theoretical conclusions are consistent with the empirical results presented in their earlier papers. This paper provides a formal theoretical framework called "the theory of factor price disparity," which explains the existence of revenue differentials between the marketing alternatives as being the result of an informational disparity over cattle quality.⁹

The literature on buyer and seller behavior in the cash market for slaughter cattle makes a strong case that varying degrees of incomplete information generate uncertainty over quality and quantity of cattle being marketed in live and dressed weight alternatives. This uncertainty, combined

⁹ A 1996 PSA study, Concentration in the Red Meat Packing Industry, reported that when packers purchase cattle dressed weight or on a formula basis, the cost per hundred weight declines 18 cents and 25 cents respectively as compared to live weight purchases (page 19). These reported results are consistent with the price differential results reported in the price discovery literature.

with risk averse behavior, creates price differentials between alternatives and sustains the demand by cattle producers for the three marketing alternatives. If the conclusions in the recent literature are correct, then a new VBMS will be successful only if the risk/return tradeoff for sellers is significantly superior to the other existing marketing alternatives. It must offset the increase in price (revenue) risk. In other words, a new VBMS will not receive broad producer support unless the new system raises the average price per-head enough to compensate producers for the increased variability in per head revenue.

The price discovery literature has a strong theoretical and empirical foundation relative to the VBMS literature. If a new grid-based VBMS is designed on the premise that the only obstacles to producer acceptance of an individual animal grading system are: 1) producers' distrust of human graders; and 2) lag time between sale and payment, then the probability of a new VBMS being successfully implemented will be greatly diminished. For a new VBMS to be successfully implemented, it must be designed so that it takes into consideration the findings presented in the price discovery literature.

EMPIRICAL EVIDENCE ON THE FEASIBILITY OF A NEW VBMS

The Animal and Range Science Department at South Dakota State University (SDSU) has conducted a Retained Ownership Demonstration Program (RODP) for beef over the last six years (Wagner et al. 1991-95). During the first five years of the project 1409 steer calves were entered into an accelerated feeding program and raised to slaughter weight. At slaughter weight, the animals were marketed under the dressed weight & grade marketing system. SDSU's animal scientists collected detailed carcass data at the time of slaughter.

The carcass data allows the marketing performance of RODP animals under the AMS grid system to be compared with the dressed weight & grade system. This is possible because an equivalent

basis price for both systems was selected. The dressed weight & grade system is two-dimensional, so weight class is not a factor. However, for heavy cattle, an across-the-board discount is common. Under dressed weight & grade, there are no premiums and the discounts are derived by aggregating the AMS grid system discount categories. Animals that were graded yield grade 4 or lower incurred a \$22.50 discount. Animals that quality graded select or standard were discounted \$4.00 and \$10.00, respectively. For cattle whose hot carcass weight was above 950 pounds, an \$18.00 cwt discount was applied.

Table 3 contains the summary statistics with respect to revenue per head under the marketing alternatives.

TABLE 3. Mean, Standard Deviation, Coefficient Of Variation, and Range of Revenue per head.¹⁰

Marketing Method	Mean	SD	CV	Max	Min
Dressed Weight & Grade	766.87	81.54	.106	1006.50	491.84
AMS-Grid System	781.74	82.86	.106	1005.70	505.76
Live weight equivalent	766.87	68.07	.089	1013.80	539.42

The summary statistics indicate that marketing under the grid system increased average

¹⁰ An hypothesis test was conducted to determine if there is a statistically significant difference with respect to average revenue per head. A test statistic of 63.9 was derived. This result strongly supports the conclusion that average revenue is higher under the AMS system. A description of the "Difference between Population Means: Matched Pairs Test" can be found in Newbold (1991, pp. 377-80). The robustness of the test is dependent on the distribution of the differences following a normal distribution. The Bowman/Shelton test for normality was conducted and a test statistic of .513 was derived. This result strongly supports the assumption that the distribution of differences is normal for the data used to construct table 3. A description of the normality test can be found in Newbold (1991, pp. 442-44).

revenue per head by \$14.87 and the standard deviation by \$1.32.¹¹ However, relative variability as measured by the coefficient of variation (CV) remained unchanged. This indicates that there is no change in the risk/return trade off between the dressed weight & grade system and the grid system for this group of animals.

Feuz et al. (1995) reported CV values of 1) .072 for live weight revenue, 2) .082 for dressed weight revenue, and 3) .084 for dressed weight & grade revenue. Their study indicates that relative variability and average revenue per head increase as sellers of finished cattle move from the live weight marketing alternative to the dressed weight & grade marketing alternative.

Ignoring the possibility of a revenue per head differential between the live and the dressed weight & grade marketing systems, the dressed weight & grade revenue equivalent live weight price per head was calculated to derive an approximate live weight CV value that is comparable to the CV values in table 3. The resulting live weight CV value indicates an approximate percentage increase in relative variability of 19% when finished cattle are marketed dressed weight & grade as compared to live weight. The implication is that there is a significant increase in the risk to return trade off as sellers move from the live weight marketing system to dressed weight & grade, as compared to no change in the risk to return trade off as sellers move from the dressed weight & grade system to the AMS grid system.

If the seller risk aversion hypothesis touted in the price discovery literature is correct, then one must conclude that a new VBMS which incorporates a grid pricing system that increases revenue

¹¹ The actual dressed weight & grade price data for the 1409 animals reveals that for those animals which attained a quality grade of choice and yield grade of less than 4 received the highest price per cwt on market day. Animals which graded select and less than yield graded 4 received the next highest price on market day. Discounts were applied to approximately 3% of the animals that did not meet the above standards. However, no premiums were given despite the fact that 65% of the animals yield graded better than 3, and 42% quality graded choice (the average yield grade was 2.7). Given that the animals were sold over a five year period, on 23 different marketing days, the dressed weight & grade systems appears to be a system of discounts only.

variability will meet producer resistance. In this case, such a system will **only** supplant the dressed weight & grade system.

CONCLUSION

The call for the development and implementation of a new VBMS for slaughter cattle is not a new issue in the beef industry. The goal of the proposed system is to provide a superior conduit for the transmission of consumer preferences for a specific type of beef product to producers than provided by the current marketing system. In turn, it is argued that producers will alter production practices to improve the consistency of cattle quality. However, such a system can only be successful if it is accepted by producers. The price discovery literature casts doubt upon the premise that such a system will be widely accepted by producers. Further research on what variables have the greatest influence on the producer's decision process when selecting a cash marketing alternative is needed. Important informational issues include: 1) does risk averse behavior on the part of producers pose a barrier to the implementation of a new VBMS? 2) what features need to be incorporated into a new VBMS to gain producer acceptance? and 3) what effect will the success or failure of the new system have on beef's long run competitive position?

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