

Live Versus Carcass Selling

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The ownership transfer of slaughter livestock, whether cattle, hogs or sheep, involves a very complex combining of values for different components to derive a value for the entire entity being transferred. That value may then be expressed as a price per cwt. for either the live animal or the carcass. Almost all the components of the animal have economic value, with the value of a number of these varying quite independently of the values of other components. At any given time or place, however, primary determinants of the animal's values are the estimated proportion of lean meat and the estimated quality thereof.

Hogs

The industry does not recognize a quality grade in the case of hogs as it does for cattle. The derivation of value in hogs is based primarily on the estimated yield of lean, but with the recognition of need for enough fatness to result in a belly adapted to current processing techniques.

Weight has a significant impact upon value derivation of hogs. The rationale for weight breaks on pork primal cuts seems to be lost in antiquity. It appears logical to speculate that price discounts for heavier weights of cuts might have originated in the fact that heavier weights were associated with animal age. Thus, heavyweight cuts were presumed to be inferior in eating quality to lightweight cuts. A second logical possibility would seem to be the generality that, within a given genetic pool, heavier animals could be expected to be fatter. Finally, because in years past primal cuts such as the ham and shoulder cuts, even though processed, were offered to the consumer with essentially no change from their natural condition with respect to weight, it is possible that unit weight was an important value determinant.

If these were the reasons for weight breaks in establishing pork primal cut values, it would seem that current and projected consumer demand – which ultimately initiates all changes in production and marketing – would strongly suggest the need for reevaluation of the practice. The prevalence of boneless ham and shoulder products in the marketplace implies that, to the extent that heavier weight cuts came from youthful animals, discounts for increased weight should be re-examined.

If increased weight of hams, for example, resulted from improved muscling and/or decreased fatness, it would seem

that such cuts should be perceived as having a higher value, rather than being price discounted. Such a practice seems even more justified when one takes into account that the labor required to convert hams to boneless ready-to-cure product is incurred largely on a per-ham basis rather than on a weight basis. As ham weight increases, labor cost per unit of production required to convert hams to boneless ready-to-cure product diminishes.

Loin weights in the case of pork represent a somewhat different challenge in that the loin's customary use as chops does not permit weight reduction per chop except by cutting thinner chops. Since there is a thickness below which most would perceive it difficult to prepare them in such a way as to maximize eating satisfaction, that could indicate a maximum acceptable weight. This, of course, is based on a traditional serving of two pork chops. A possible way of adapting to the need to maintain a desirable weight per serving might be to suggest a single chop per serving, thus permitting an acceptable thickness of chops cut from heavier weight loins.

Cattle

In the case of cattle, it is generally accepted that fatness, carcass weight and quality grade are all positively associated with each other and that they are all negatively associated with cutability. Further, carcass yield as percent of live weight (dressing percentage) is positively associated with the first three criteria and is also negatively associated with cutability.

If one is to implement price differentials for different value criteria, it is of extreme importance that an appropriate starting point be established above which premiums will be paid and below which discounts will be applied. For cattle, it would seem appropriate that such a point be established as the average yield grade within a quality grade. Thus, the starting point for differentials is subject to shifts to reflect population changes in yield grade within each quality grade. It should not be expected to remain a constant point.

While current consist studies of the U.S. fed beef population are not available, the USDA grading review results (USDA 1984a) for 1983/84 suggest that Choice cattle might currently have an average yield grade of about 3.4 and the Good grade of about 3.1, as shown in Table 1. Table 2 presents the expected yield of retail cuts, fat trim and bone from each yield grade (USDA 1984b). Since all the component yields exist in that expectation in a straight-line relationship with yield grade, one can extrapolate between yield grades to any decimal part of a yield grade.

Approximate current values necessary to derive differentials are U.S. Choice Yield Grade 3 steers \$100.00 per cwt.; U.S. Good steer carcasses \$97.00 per cwt.; fat tissue

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Table 1. USDA Quality Grade/Yield Grade Distribution

Y.G.	Y.G. % Within Quality Grade			
	Choice	Mean Yield Grade	Good	Mean Yield Grade
≤1.4	.76		2.13	
1.5 - 1.9	2.18	1.585	4.18	1.549
2.0 - 2.4	7.02		12.94	
2.5 - 2.9	18.73	2.603	22.03	2.535
3.0 - 3.4	27.88		25.51	
3.5 - 3.9	23.65	3.427	19.52	3.399
4.0 - 4.4	12.67		9.99	
4.5 - 4.9	4.85	4.309	2.65	4.272
5.0 - 5.4	1.41		.77	
≥5.5	.82	5.374	.26	5.277
Total		3.358		3.109

Table 2. Beef Yield Expectations From USDA Yield Grades

	Yield Grade				
	1	2	3	4	5
Retail Cuts	82.0	77.4	72.8	68.2	63.6
Fat	7.6	12.7	17.8	22.9	28.0
Bone	10.4	9.9	9.4	8.9	8.4
Total Carcass	100.0	100.0	100.0	100.0	100.0

\$23.00 per cwt. and bones \$6.50 per cwt. By crediting fat and bone and forcing retail cuts to be priced at a level that recovers cattle values, one can derive the cost per pound of retail cuts from each quality grade. The necessary price for the retail cuts from the Choice grade thus is seen to be \$1.3023 per pound, and, for the Good grade, \$1.2428 per pound, as shown in Table 3.

Although many might call this naiveté, for the purposes of this discussion the assumption will be made that "true" values are fully recognized by the industry. Further, it is assumed that under any given situation, yield of saleable retail cuts within a quality grade is the overriding value determinant. Hence, retail yields valued as shown in Table 3 plus fat tissue and bone values then permit a relatively precise calculation of carcass value for the various quality grade and yield grade combinations.

Table 4 depicts a hypothetical purchase of 100 head of fed steers in which 90 head grade Choice and 10 head grade Good. In addition, 38% were Yield Grade 2 or better, 56% were Yield Grade 3 and 6% were Yield Grade 4. By almost anyone's definition, that lot represents a very desirable purchase. It should be noted that high-cutability cattle tend to be lighter in weight. Thus, while Yield Grade 2 or better cattle represent 38% of the cattle, they represent only about 35.98% of the weight. Yield Grade 3 describes 56% of the

Table 3. Value Derivation For Retail Cuts

	Choice Y.G. 3.4			Good Y.G. 3.1		
	Yield	Price	Value	Yield	Price	Value
Retail Cuts	73.26	\$1.3023	\$ 95.41	74.64	\$1.2428	\$92.76
Fat	17.29	.23	3.98	15.76	.23	3.62
Bone	9.45	.065	.61	9.60	.065	.62
Total	100.00		\$100.00	100.00		\$97.00

cattle and 57.34% of the weight, and Yield Grade 4 includes 6% of the cattle but 6.67% of the weight. It is often convenient to talk about the number of head within a grade, but lot values are determined by weight within a value category.

Having generated a base price per pound of retail cuts within each quality grade, it is then possible to generate a carcass price for each description of cattle in the purchase, as shown in Table 5. Based upon cutability within quality grade only, one finds that the yield grade difference between Choice Yield Grade 2 and 3 is in fact 0.83 yield grade. The price difference would be \$4.05 per cwt. (\$4.88 per full yield grade). The difference between Choice Yield Grade 3 and 4 is 0.95 yield grade and the price difference is seen to be \$4.60 per cwt. (\$4.84 per full yield grade).

The assumption is made that the purchaser of these cattle is engaged in slaughter and fabricating. Currently the total kill/fabricate cost may be estimated at about \$85 per head. Obviously, any particular processor will vary from that, but the effect is the same other than in magnitude.

Since the average weight of the steers in this lot is about the same as the average for the U.S., one can use that weight as the basis for calculating an average cost to process, from which purchase differentials would be derived.

That base cost is \$12.27 per cwt. dressed carcass. Thus, lightweight cattle cost more per cwt. to process, and therefore must be purchased at a discount; the converse is true for cattle heavier than the base weight. Table 5 also shows carcass purchase price adjusted for weight within yield grade and quality grade.

The price difference between the Yield Grade 2 and 3 Choice now narrows from \$4.05 per cwt. for cutability alone to \$2.92 per cwt. when dressed weight is taken into account. The differential between Choice Yield Grade 3 and 4 narrows from \$4.60 per cwt. for cutability alone to \$3.71 per cwt. when dressed-weight price adjustments are added. Similar effects of weight are true for the Good grade as well.

Table 5, with prices adjusted for quality grade, yield grade and weight, provides the basis for pricing of cattle purchased on any particular market. (No provision has yet been made for abnormalities, such as bruise or grub damage, etc.) In trading, of course, these prices would be rounded to the nearest \$.25 or \$.50 per cwt.

Each purchaser will recognize the extent to which the realization of these yield grade differentials exists for him. Those differentials used to derive the prices in Table 5 reflect the assumption that all value differences reflected by retail yield are available to the processor purchasing this lot of cattle, and therefore are available to be reflected in the

Table 4. Quality Grade, Yield Grade & Weight Distribution

Choice				Good			
Y.G.	No. of Head	Dressed Wgt.		Y.G.	No. of Head	Dressed Wgt.	
		Avg.	Total			Avg.	Total
2.4	3	595	1785	1.5	3	590	1770
2.5	20	657	13140	1.6	1	610	610
2.6	7	740	5180	1.7			
2.52*	30	670	20105	1.53*	4	595	2380
Sub-Total							
3.2	4	595	2380	2.2	1	590	590
3.3	20	680	13600	2.3	3	620	1860
3.4	30	750	22500	2.4			
3.35*	54	713	38480	2.28*	4	613	2450
Sub-Total							
4.1				3.0			
4.2				3.1	2	630	1260
4.3	6	770	4620	3.2			
4.3	6	770	4620	3.1	2	630	1260
Sub-Total							
3.16*	90	702	63205	2.16*	10	609	6090
Grand Total							

Avge. Wht.	693	No.	90	Wgt.
Y.G.	3.07	#Ch.	90	91.2
		% Gd.	10	8.8

*Weighted Average: Sum of the cross-products of yield grade times total carcass weight within each 1/10 yield grade divided by total carcass weight for the yield grade.

purchase price to be paid. While that is not generally the case, the attempt here is to demonstrate the full potential price reflection of retail yield.

In any event, purchase of cattle on a dressed weight basis would be, in this example, based on rounded numbers from Table 5, with appropriate penalties for abnormalities and additions for "drop credits."

After having derived an appropriate carcass price, one has only to reflect dressing percentage to convert that price to live price per cwt. However, again quality grade, yield grade and weight affect dressed yield. While the experience of the purchaser will dictate the magnitude of that effect, Table 6 represents the effect of each as used herein. Table 7 depicts the dressed yields of the purchased cattle, reflecting the various combinations of quality grade, yield grade and weight.

Table 8 portrays the live price (exclusive of drop credits) that would then represent the reflection of quality grade, the full reflection of yield of retail cuts and carcass weight. This table obviously does not reflect an absolute price, but rather can be used to reflect price differentials reflecting these three value criteria.

Because of the often contradictory effect of value criteria, differentials must accommodate each factor and properly

recognize it in arriving at a final offering price. The suitability of quantified recognition of value criteria is also impacted by a number of practical considerations.

Paramount among these is that one is dependent, particularly in the case of live purchase, upon estimates of these criteria. It is somewhat analogous to judging the eating qualities of a watermelon without either plugging it or cutting it open. A second practical limitation is the rate of the appraisal process. Time does not permit the rather laborious and definitive series of calculations shown as a part of this discussion. Appraisal conditions, such as muddy lots, adverse weather, etc., also affect the individual buyer's ability correctly to appraise a lot of cattle. Additionally, the lot portrayed herein is relatively uncomplicated: steers only, only Choice and Good, and no need to recognize damaged cattle.

In summing up this cattle purchase, yield grade differentials might have been portrayed as about \$5.00 per cwt. of carcass. Yet when the contradictory effect of quality grade, carcass weight and dressed yield was taken into account and the full effect of yield grade reflected in live price, that differential became about \$1.50 per cwt. alive.

In addressing the subject of live versus carcass sale, obviously the issue of damaged carcasses must be recognized. It behooves producers, truckers and kill plant employ-

Table 5. Carcass Price Derivation

Choice			
Y.G.	Avge. Wgt.	Price Adj. For	
		Yield Grade	Wgt.
2.4	595	104.85	102.83
2.5	657	104.36	103.69
2.6	740	103.88	104.66
2.52*	670	104.28	103.86

Good			
Y.G.	Avge. Wgt.	Price Adj. For	
		Yield Grade	Wgt.
1.5	590	104.31	102.17
1.6	610	103.88	102.22
1.53*	595	104.20	102.18

3.2	595	100.97	98.95
3.3	680	100.48	100.25
3.4	750	100.00	100.94
3.35*	713	100.23	100.57

2.2	590	101.13	99.01
2.3	620	100.67	99.23
2.28*	613	100.78	99.18

4.3	770	95.63	96.86
4.3	770	95.63	96.86

3.1	630	97.00	95.78
3.1	630	97.00	95.78

*Weighted Average: Sum of the cross-products of yield grade times total carcass weight within each 1/10 yield grade divided by total carcass weight for the yield grade.

Table 6. Dressed Yield as Generally Related To Quality Grade, Yield Grade & Carcass Wgt.

	Carcass Weight	YG 1.5	YG 2.5	YG 3.5	YG 4.5	YG 5.5
Choice	550	60.5	61.0	61.5	62.0	62.5
	650	61.0	61.5	62.0	62.5	63.0
	750	61.5	62.0	62.5	63.0	63.5
Good	550	58.5	59.0	59.5	60.0	60.5
	650	59.0	59.5	60.0	60.5	61.0
	750	59.5	60.0	60.5	61.0	61.5

ees to be alert for potential bruise damage and to take appropriate steps to minimize it. Grandin (1981) found that cattle sold on a liveweight basis had 14% discountable bruises and those sold on a carcass weight basis had 8%. Purchase on a liveweight basis compels the buyer to reflect, in the price paid, damage effects experienced in the past.

Such a reflection will be primarily on an overall average basis. Therefore, those who through careless handling have a high incidence of bruise damage are likely to be paid less of a discount than is truly justified. The converse is also true. Carcass basis purchases permit a reasonably accurate assessment of the value impact of bruise damage and its specific association with a given lot.

Just as weighing conditions, shrink, etc., constitute a part of the definition of a live cattle purchase, carcass description

probably should be defined in the case of purchase on a carcass basis. Dressing procedures can be different between plants for good reasons. If all cattle are purchased on a liveweight basis, and if all cattle are fabricated by the purchaser, these differences are essentially of interest only to the purchaser. For example, certain items that sometimes remain on the carcass but are routinely removed during fabrication may well be more cost-effectively removed on the kill floor than during fabrication.

It is obvious that either cattle or hog purchases on a carcass weight basis eliminate the need for estimates of dressed yield, which is a significant live animal price determinant. In addition, the lean yield determinants, such as fatness and muscling, are much more directly observable in the carcass. In the case of fatness in either cattle or hogs and in

Table 7. Dressed Yield Expectations

<i>Choice</i>			
<i>Wgt. Range</i>	<i>Avg. Wgt.</i>	<i>Y.G.</i>	<i>Dressed Yield</i>
5-6	595	2.4	61.18
6-7	657	2.5	61.54
7-8	740	2.6	62.0

<i>Good</i>			
<i>Wgt. Range</i>	<i>Avg. Wgt.</i>	<i>Y.G.</i>	<i>Dressed Yield</i>
5-6	590	1.5	58.70
6-7	610	1.6	58.85
7-8			

5-6	595	3.2	61.58
6-7	680	3.3	62.05
7-8	750	3.4	62.45

5-6	590	2.2	59.05
6-7	620	2.3	59.25
7-8		2.4	

5-6		4.1	
6-7		4.2	
7-8	770	4.3	63.05

5-6		3.0	
6-7	630	3.1	59.70
7-8		3.2	

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Table 8. Live Price Derivation (Excluding Drop Credits)

<i>Choice</i>			
<i>Avg. Y.G.</i>	<i>Avg. Wgt.</i>		<i>Live Price</i>
	<i>Carcass</i>	<i>Live</i>	
2.4	595	973	62.91
2.5	657	1068	63.81
2.6	740	1194	64.89
2.52*	670	1087	64.01

<i>Good</i>			
<i>Avg. Y.G.</i>	<i>Avg. Wgt.</i>		<i>Live Price</i>
	<i>Carcass</i>	<i>Live</i>	
1.5	590	1005	59.97
1.6	610	1037	60.16
1.53*	595	1013	60.02

3.2	595	966	60.93
3.3	680	1096	62.21
3.4	750	1201	63.04
3.35*	713	1145	62.61

2.2	590	999	58.47
2.3	620	1046	58.79
2.28*	613	1035	58.71

4.3	770	1221	61.07
4.3	770	1221	61.07

3.1	630	1055	57.18
3.1	630	1055	57.18

*Weighted Average: Sum of the cross-products of yield grade times total carcass weight within each 1/10 yield grade divided by total carcass weight for the yield grade.

the case of muscling in cattle, objective measurements can be made as well.

Greater precision in estimating lean yield is therefore possible when observing the carcass. Normal packing plant procedures permit routine assessment of quality in cattle, thus eliminating the need to use indicators in estimates of this trait. Bruise or grub damage, or the absence thereof, can be easily observed and reflected in the amount paid for any specific cattle or hog purchase.

It is apparent that values of livestock can be more accurately determined on a carcass basis than on a live basis for all the reasons mentioned. One might then ask, why not transfer ownership of all market livestock on a dressed weight, quality and cutability basis? The answers are probably at least as complex as is the derivation of livestock values. Whether the perceptions are correct or not is not the thrust of this discussion. Nonetheless a number of concerns are expressed by sellers of livestock.

There is some concern that control of the final price received is shifted, at least in part, to the packer when selling on a carcass weight basis. Probably also a consideration is that the seller would prefer to accept an overall average penalty for damaged or condemned carcasses rather than

risk a higher discount if such actually materialized in the case of his particular livestock. Of concern for some is the dressing procedure, which can affect carcass weight, which becomes the basis for payment for purchases made on a carcass basis.

Finally, it appears obvious that sales on a dressed weight, quality and lean yield basis permit a more accurate reflection of the value of each purchase of livestock. The perception that options are broader when price is established on the basis of live weight is probably a significant deterrent to changing to carcass weight basis for ownership transfer. In the final analysis, conditions of sale have historically been a matter of negotiation between buyer and seller. While one might make a strong case for either mode of transfer, it is probable that negotiation between buyer and seller with each protecting his own self-interests may yet be the most appropriate way to establish livestock values.

References

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 USDA (1984a): Personal communication.
 USDA (1984b): Personal communication.

Discussion

R.G. Kauffman: One important ingredient has been left out. Condemnations. Who pays for the condemnations?

Breidenstein: I didn't mean to bypass that, Bob. There is some data published by Temple Grandin which says that: "If we are looking at cattle sold on a dressed weight basis, we find the bruise and condemnation damage about half what it is if they are sold on a live basis." So in the case of carcass weight buying, of course, that is tied specifically to that producer who was, in fact, responsible for those damages. When that is not done, it is spread over everybody's cattle.

There are all kinds of discussions on this – for example, when you go out to buy cattle at a producer's yards, we used to have an index file card system for our cattle buyers, where he had to have his "experience" with those cattle for ump-teen buys before. What was his experience on liver condemnations? What was his experience on bruise damages? When the guy said they'd been treated for grubs, what was his experience? When he said they hadn't, what was his experience? So, all of that got built in, to the extent of his ability, to reflect it back to our experience with that particular supplier. When you had no such record, however, you took something like the average experience and cranked that into your buy decision and price derivation. So to answer the question, to the extent that the industry can, it relates it back to the guy who has really controlled it. To the extent that they can't, there's still a lot of buying on averages to provide an insurance policy on every single head bought, reflecting the average experience of yield and condemnation losses.

D. Schafer: Would there be any difference in condemnation levels generally between yield grade 2 cattle and yield grade 3?

Breidenstein: I never saw any differences in that regard. You do have differences. For example, liver condemnations,

which depend upon how hot the ration has been and how hard they have been pushed. In reality, I never saw anything that related it to yield grades. There is one thing you should perhaps reflect on in yield grades, and I don't know of anyone who has that kind of information, but there is no question in my mind, that kill fats increase as yield grade number increases. So the fatter the cattle, the higher the kill credits. We are not smart enough, or I was not smart enough, to figure out how to reflect that, but there is no question that the fatter the cattle, the higher the kill credits, in terms of the kill fats. For other factors, I suspect there is an inverse relationship, but in any event those relationships are not presently reflected to my knowledge.

J. Muchow: In terms of the packers' reputation in establishing a grade and yield program, this has not been taken very well by producers. I sense it is an age-old problem – the feeders don't trust the packer on how he's going to take care of those animals until they get to the grading chain. What can the packers do to establish this credibility so that we can implement some things like this as opposed to buying everything on averages?

Breidenstein: Well, I think you pointed out a natural inclination. Often the packer is viewed by the producer a great deal like I view the used car salesman – I don't trust him too far. I don't think that mistrust is warranted. I think most packers – and I can't say that's true of all, but if you want to watch your cattle killed, dressed, fabricated, graded, most packers would say, "Come right in and see it, there's nothing to hide."

Another thing I think you should know. I thought it was very unfair, also rather stupid, but it's a rule. We had cattle that were held over for contested grading, grade and yield, and I had to pay for them the next day by law. I think it was

over a week back then, at least four or five days later, a couple of those cattle got graded. I'd already paid for them, because the law says I had to, but when we found they had been regraded, I went back and paid them again on the basis of the regrade.

That was back when it was still possible to get cattle graded at a branch distribution center. So, theoretically, no matter where I got those graded, I had to come back and reflect the final grade in my purchase of those cattle. Think of the mess you get into numbers-wise with that. That still is true, as far as I know. Whenever that cattle gets graded, even if it's two weeks later and you've already paid for the cattle, if there was an upgrade, you owe the guy the money. There are a lot of things like that, but I think the important point in answer to your question, is that there's no big secret in this.

If you think anyone in the packing business is running them past him at 200 or 300 an hour, and can say to their hourly employees, "Here comes a load of cattle, we want you to do this a little different," you've got to be kidding. You'd have the worst mess you ever saw before the day was over. So there's nothing done any different on any load of cattle bought "grade and yield" compared to a load of cattle bought alive.

But that still doesn't negate the fact that we have not defined, so far as I know, what is "a standard carcass." Whatever I do as an individual packer, even if I do it differently, is fine. I build that in and reflect back what it would have been compared to a standard carcass. That's simply arithmetic – it's not hard and computers can do it easily. It is possible.

I do think there is a serious problem. I've bought cattle, and they're as different as night and day from packer A to packer B in the method of dressing and resulting yields. It came up again just the last few days when a major feeder asked me about it.

I've tended to share the opinion that, if we could just get them on the rail, then we can resolve all this diverse opinion about what the values are. However, there still are differences in the number of tail vertebra left on, the length of hind shanks, the amount of diaphragm, etc. We at least get closer to the ultimate value with on-the-rail buying. It's a little like buying cut watermelon as opposed to thumping them to see how ripe they are. We get closer to the value by cutting, but even then we need to define what the meat of the watermelon is, if we do it. So, I think if we are to encourage rail buying, which a number of you have done and I agree that it will increase the precision with which we can derive values, we also have to understand some very basic and fundamental dollar-and-cent issues that should be addressed before we can suggest further changes. There is a very real need to define what a standard carcass is. The industry will work out adjustments and compensations.

Dave Schafer: I'd like to close this session by saying that after seeing some of the terminology on meat cut names Rich had up on the screen, I hope that we are challenging you and your teaching programs to be incorporating some of this new terminology into your vocabularies, not just using what you learned 15 to 40 years ago.

There has been quite an evolution, and perhaps revolution, in many areas of meat trade communication the past 15 years. You'll also find different packers have somewhat different terminologies and ways of doing certain tasks.

I hope also, that we are challenging you to use some pricing, some economic principles in your teaching. I think that our students going out – and I'm seeing an increasing number of our students in packing plants – have to adapt to these situations. Hopefully, they're being well prepared so they can lead early in their careers to help this industry compete with other food businesses and progress.