

USDA Certification of Beef Tenderness: An Overview of Economic Considerations

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Introduction

Years of research reveals U.S. consumers value beef tenderness. However, full realization of improved and/or guaranteed tender beef has been limited for several reasons including uncertain incentives and reward mechanisms encouraging industry stakeholders to adjust practices and invest in processes which improve beef tenderness. In response to this situation, the USDA-AMS has been engaged in a process of designing a tenderness standard for beef intended to facilitate the industry making corresponding marketing claims and to better align incentives for assuring tenderness. The most recent proposal indicates that eligible beef products could carry “USDA Certified Tender” or “USDA Certified Very Tender” labels.² Such a program has the potential to profoundly influence the beef industry. After reviewing the draft document underlying the standard practices proposed for USDA to use in verifying beef tenderness claims, this short discussion was composed to:

1. Share preliminary reactions to the USDA-AMS draft document,
2. Succinctly note relevant economic literature regarding beef tenderness,
3. Provide demonstrative examples of the significant economic impact involved, and
4. Outline key unanswered questions and issues which may influence the realized economic impact of an implemented USDA beef tenderness standard.

The main conclusion of this preliminary assessment is a recommendation that the USDA and industry leaders engage in additional joint efforts to assess the appropriateness of proposed standard practices before they are implemented. The significant economic impact presented both by implementing an effective tenderness certification process and by potentially missing an important opportunity given a multitude of unaddressed issues of economic relevance underlies this recommendation for additional effort.

Economist Reactions to the Draft Standard Practice USDA Document

- After reviewing the draft document released by USDA, it remains unclear what minimum tenderness threshold values (MMTV) are being considered for this program. Accordingly one cannot objectively assess what portion of product may be eligible for this program or how desirable the eligible product will actually be to consumers. More narrowly, this raises question to the applicability of existing research which mainly is derived from shear force backed claims of tenderness provision.

¹ Special thanks are extended, without implication, for the helpful comments and suggestions provided by Dr. Ted Schroeder on an earlier draft of this document. This document was further improved by the roundtable discussion at the USDA-NIFA Regional Project: W-2177 meeting in Denver, CO on July 24-25, 2012.

² The draft document reviewed on July 30, 2012 is available at:
<http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELPRDC5095042>

- Section 6.4 of the USDA tenderness claim proposal indicates three methods will be allowed for testing if the MMTV are met. The inclusion of multiple methods may add flexibility that is desired by some industry stakeholders. However, the increased variation in tenderness resulting from varying methods of tenderness assurance must be appreciated. For example, the work of Alfnes, Rickertsen, and Ueland (2008) suggests that both average tenderness and variance of tenderness influence the premiums consumers are willing to pay for this meat product trait. The extent to which a standard is set in a broad manner potentially compromising the ability to confidently reduce tenderness variability experienced by consumers purchasing products carrying the associated marketing claim warrants serious assessment. At a minimum, if tenderness uncertainty still exists following the proposed standards, the value of the certification in general could be markedly reduced. More drastically, failure to remove adequate tenderness uncertainty could result in an overall negative outcome as adverse spillovers could develop from undesired eating experiences consumers realize on tenderness certified premium meat products. That is, if you tell consumers the product is tender and it turns out not to be, this can result in damaging the credibility of any industry tenderness claims and perhaps other product claims besides tenderness.
- Section 6.4.3 overviews the "Quality Management Method" allowed for testing product consistency with the MMTV. The list of "controlled elements" includes both post-harvest (electrical stimulation, aging period, carcass/item sorting system) and pre-harvest (genetics, age of livestock) practices. The requirement for at least three of these "controlled elements" to be included presents potential challenges regarding the ability of meat and/or live animal traceability systems to substantiate claims. Implications of related industry disagreement and challenges involving traceability must be noted (Pendell et al., 2010; Schroeder and Tonsor, 2012; Schulz and Tonsor, 2010). Moreover, as an economist, and not meat scientist, the extent to which including these various "controlled elements" results in more variable tenderness outcomes as noted in the previous paragraph is not clear but could be economically important.
- Section 6.6.1 notes that if the carcass *longissimus dorsi* (ribeye or loin eye) meets the MTTV requirement eight other muscles will also qualify without having to be directly measured. Regardless of the appropriateness of this assumption, the issue of consumer expectations comes to mind. Narrowly, when paying a premium for a Tri-tip (*tensor fasciae latae*) carrying the potential "USDA Certified Tender" claim would consumers expect a similar experience as when consuming a ribeye carrying the same label? This question has not been addressed, but the extent to which similar consumer perception, product-spillovers exist warrants evaluation. If this expectation exists and consumers ultimately are disappointed with their Tri-tip purchase, the broader value of the tenderness claim would be impacted.
- Section 6.7 notes that non-inherent processes such as mechanical tenderization would be precluded from this program. What warrants related consideration is the impact of potential introduction of a product carrying the label "Mechanically Guaranteed Tender" which is widely advertised and assured to meet a specific shear force based threshold set at a more stringent level than the MTTV of the proposed USDA program. While this product would not be enrolled in the proposed USDA program, it certainly would influence the broader

value of "USDA Certified Tender" claims. Depending on the costs of enrolling in the USDA program, restrictions this places on interested stakeholders, and possible differences in consumer outcomes one may reasonably expect the marketplace to adapt in this manner following implementation of the USDA standard.

Literature Overview

Several studies have conducted experiments and derived estimates of what consumers would pay for beef tenderness. A review of this literature is provided by Riley et al. (2009). A related discussion of various factors influencing aggregate meat demand in the U.S. is provided by Tonsor, Mintert, and Schroeder (2010).

One often cited study is Lusk et al. (2001) who estimate average premiums of \$1.84/lb for ribeye steaks following study participants completing a taste test and receiving information about the tenderness of available steaks. Another commonly cited study is the work of Shackelford et al. (2001) who conducted a nationwide study where 50% of participants indicated they would "definitely pay" or "probably pay" \$0.50/lb more for a strip loin steak described as "Tender Select."

These two studies are highlighted as they have a common trait with the existing literature. Narrowly, there is no known study examining products carrying both tenderness assurances and USDA certification in a manner consistent with the "USDA Certified Tender" claims noted in the current USDA proposal. This may be important for several reasons.

The findings of Olynk, Tonsor, and Wolf (2010a) indicate consumers value attribute claims more when certified by the USDA. This may imply that the value of a claim combining tenderness assurance and USDA certification may be higher than existing studies suggest.

This potentially higher premium may be partially offset, as the research of Gao and Schroeder (2009), Tonsor (2011), and Pozo, Tonsor, and Schroeder (2012) suggests willingness to pay (WTP) for meat attributes depends on the relationships of newly added attributes with pre-existing attributes available to consumers. Consumers make inferences from meat label attributes about attributes which are not explicitly shown to them in experiments. Previous examinations of WTP for tenderness in isolation might over-estimate the WTP that may consumers might actually willingly pay in retail settings where meat products carry information on multiple attributes. The extent to which this applies in the specific case of beef tenderness is unknown but warrants appreciation. Secondly, the possibility of introducing a USDA certified tenderness standard into the market having significant impact on the value of existing products or attribute claims which consumers may currently associate with tenderness warrants additional consideration. For instance, the USDA has a set of existing Process Verified Programs which include verified claims that arguably are obtaining some of their current value from inferences consumers make regarding quality attributes that may include tenderness. The extent to which introduction of a USDA certified beef tenderness standard influences these and other existing products in the current marketplace is unknown.

Finally, most existing tenderness demand research was conducted in an environment of lower retail beef prices, higher domestic per capita beef consumption, and before the recent domestic

recession. The extent to which this may influence the applicability of existing research and corresponding expectations of tenderness is not clear.

Illustrations of Economic Impact Magnitude

A comprehensive assessment of the economic impact implementation of the proposed USDA standard is beyond the scope of this discussion. Alternatively, a few demonstrative examples are provided to simply provide context on the significant magnitude of economic impact at hand.

- One way to demonstrate the potential increase in consumer valuation of beef a tenderness certification program may offer is to conservatively estimate the total increase in retail sales. The lowest estimated tenderness premium reported by Riley et al. (2009) in their assessment of the literature is \$0.42/lb. Using this estimate along with other conservative assumptions of 25% tenderness rates among slaughtered fed cattle, annual steer and heifer slaughter volumes of 27 million, and 15% of carcass weight being from products presenting tenderness value to consumers, the gross annual retail value of the tenderness attribute alone exceeds \$340 million annually. This value may be viewed as a very conservative estimate of the increased retail value which may be available for distribution within the beef industry to cover occurrence of additional costs associated with garnering these consumer premiums. To demonstrate the conservativeness of this estimate, using \$0.92/lb (50% of the commonly cited value of \$1.84/lb offered by Lusk et al., 2001) increases this estimate to over \$745 million.
- Weaber and Lusk (2010) provide an assessment of how selecting bulls based on genetic information tied to improved tenderness would impact industry profitability. Their assessment suggests effective selection of bulls in the top 30% of genetic merit for tenderness would produce economic benefits with a net present value of \$7.6 billion.
 - While several companies are already providing genetic tests and portions of this potential economic gain could certainly be realized in the absence of a USDA certified tenderness standard, the presence of such as standard would improve the ability of industry stakeholders (particularly cow-calf producers in this instance) to have clearly defined incentives encouraging them to further invest in programs improving genetics. If a USDA standard raised the probability of the industry obtaining this estimated net present value by 10%, it would amount to a total net benefit of roughly \$760 million.
- Riley et al. (2009) provide the only known study demonstrating how tenderness could be augmented to the current fed cattle grid marketing system. The authors use an equation provided by Platter et al. (2005) estimating the relationship between consumer WTP for tender beef strip loin steaks and WBSF to evaluate how beef carcasses would be valued under traditional grids versus grids augmented with tenderness information. The authors estimate inclusion of tenderness information would adjust prices of grid valued carcasses by an average of \$4.98/cwt. This adjustment includes both over- and under-valuing cases when existing grids are utilized. For instance, using a 3.8 kg shear force base about 7% of carcasses would receive premiums exceeding \$7.50/cwt and about 14% would receive discounts in excess of \$7.50/cwt.

- To provide scope on the implied economic impact, approximate values consistent with 2011 of 27 million steers and heifers being slaughtered, 66% of fed cattle being sold thru channels besides negotiated cash, and dressed weights of 793 lbs are used. Applying the estimated \$4.98/cwt value adjustment to these estimated, eligible carcass lbs results in a total annual impact of over \$700 million. It is important to recognize this value is simply the total adjustment (both up and down) that would be experienced at the fed cattle marketing level if tenderness information was added to base grids.
- Miller et al. (2001) estimate retail steak value differences from improved tenderness may correspond to carcass premiums of \$36.58 to \$76.26 (depending on shear force improvements). Using an assumed dressed weight of 793 lbs these estimates correspond to \$4.61/cwt to \$9.62/cwt values which is a range capturing the Riley et al. (2009) estimates.
- The recent assessment by Griffith and Thompson (2012) of the economic benefit provided by Australia's Meat Standards Australia (MSA) voluntary meat grading system is also worth highlighting. The authors estimate the cumulative gross benefits of the MSA program to be \$523 million, \$430 million, and nearly \$250 million respectively for the retail, wholesale, and producers ("over the hooks" pricing nomenclature is used in a crudely similar manner to the U.S. grid approach). The net benefit-cost ratios for the MSA program are estimated to be between 1.72 and 2.39. These gross benefit values are in Australian dollars (current exchange rate is about \$1.00 USD=\$0.95 AUD), are derived for a voluntary system implemented in a country with significantly fewer cattle than the U.S., and the MSA system certainly differs from the proposed USDA certified tender standard. That being said, these estimates provide further evidence of the economic impact at hand in this discussion.

Recognize that not all beef which passes the proposed tenderness thresholds would be marketed with that attribute on the label. Moreover, these example values should not be considered additive. It is further critical to understand these demonstrative calculations are presented in static fashion not accounting for market adjustments, do not directly reflect details of the proposed USDA standard, and accordingly should not be directly utilized as precise estimates. Alternatively, they are included solely to demonstrate significant economic impact is at hand in this discussion.

To estimate the economic impact thorough assessment of the implications of the current USDA standards proposal is required. In particular, an examination of market level impacts accounting for reactions to retail demand enhancement and increased production costs of enhancing tenderness provision is recommended along the lines of those used by Pendell et al. (2010) and Schroeder and Tonsor (2011). A multi-market level assessment would also provide important insight into the distribution of economic impacts within the beef and cattle marketing chain. For instance, the genetic bull selection strategy evaluated by Weaber and Lusk (2010) found economic benefits to be distributed as follows: 31% to consumers, 10% to retailers, 3% to packers, 7% to feedlot operators, and 49% to cow-calf and stocker operations. The parallel distribution following implementing the proposed USDA standard would be valuable to quantify.

Additional Considerations

This section lists several additional considerations that may influence the realized economic impact of the proposed USDA standard.

- The importance of a product consistently providing the consumer with the eating experience they expect when making a purchasing decision cannot be overstated. A wealth of meat demand research indicates a key driver of domestic beef demand decline over the past three decades is the relative inability to provide consumers a comparably consistent product similar to that offered by pork and poultry. Corresponding recognition of this is important in consideration of how well the standards are at assuring the end retail product is indeed consistently tender. As noted by Alfnes, Rickertsen, and Ueland (2008), consumer valuation of tenderness reflects both average tenderness and variance of tenderness, each of which is influenced by selected standards. Moreover, the related use of "technology neutral" standards in U.S. animal identification systems and their relative value in the international marketplace (see Schroeder and Tonsor, 2012) hold parallel lessons and words of caution in implementing too loose of a standard.
- The election of a discrete labeling approach rather than conveying tenderness in a continuous fashion to consumers has implications. On one hand, it likely is simpler to implement minimum thresholds for tenderness and to simply establish eligible/not eligible distinctions. However, as noted by Schroeder, Riley, and Frasier (2008) this approach would lose much of the value and efficiency available with implementing a system based on continuous tenderness measurement. Moreover, Miller et al. (2001) suggests consumer acceptability strongly reflects adjustments over a continuum of shear force based tenderness values. This point is also related to the previously noted inability to identify and understand the minimum threshold underlying the proposed USDA standard. Ultimately, serious consideration of a clear and objective system which conveys more rather than truncated tenderness information is encouraged.
- Nearly any industry wide program is subject to what economists call free-riding issues. In the context of beef tenderness investments of a subset of the industry in enhancing beef demand also benefits non-investors. Moreover, the heterogeneous situations and perceptions of these operators observed in other industry issues spanning from castration prevalence to animal identification system participation (USDA 2008; Schulz and Tonsor, 2010) would likely manifest again in provision of beef tenderness. Ultimately the net impact for various segments of operations at each level of the supply chain is influenced differently and these differences will underlie varied voluntary engagement in tenderness enhancement and certification programs as well as in the exercised support for said programs.
- The extent to which addition of a USDA tenderness standard influences profitability risk warrants assessment. For instance, recent work by Belasco, Schroeder, and Goodwin (2010) found feedlot producers face trade-offs between quality and yield grade outcomes with production measures such as average daily gain and feeding efficiency. The role of adding tenderness risk to this overall variability faced by producers is not clear but warrants

assessment to avoid unexpected outcomes such as limited provision of tenderness similar to the findings of this study regarding less than expected movement to grid pricing of cattle.

- The list of "controlled elements" including both post-harvest (electrical stimulation, aging period, carcass/item sorting system) and pre-harvest (genetics, age of livestock) practices may present challenges in any effort to estimate the cost of enrolling product in the proposed USDA standard systems. The concluding remarks of Olynk, Tonsor, and Wolf (2010b) highlight the fact that post-harvest practices can be implemented on a targeted set of products or cuts while pre-harvest practices influence production costs for an entire animal and hence all aspects of the resulting carcass. The implication of this on likely adjustment of the industry to engage in an available USDA program and potential differences which could manifest from this within the industry in an effort to efficiently participate in the program warrant further assessment as this may notably influence the distribution of net impacts across market levels in the industry.
- The observation of increasing product differentiation and proliferation of brands for beef steaks along with this USDA program being focused on beef steaks is important. Narrowly, the extent to which brand equity of existing steak products may be influenced by introduction of a USDA certified tender program is worth further investigation (Schulz, Schroeder, and White, 2012).
- Broadly it is important to appreciate the role of enhancing quality and effectively conveying this information to beef consumers. As the U.S. increasingly competes globally with grass-fed beef producers and domestically with other proteins, the economic viability of the industry progressively hinges on the ability to provide products carrying the inherent quality expected when consumers pay higher prices for U.S. beef. The extent to which the proposed USDA program improves this ability is critical to both broadly appreciate and to use as a barometer in examining specific details of the underlying standards ultimately implemented.
- Recognition of the important difference between mean WTP estimates and the portion of the public which may be willing to pay premiums is encouraged. For instance, using scanner data Chang, Lusk, and Norwood (2010) estimate U.S. consumers are willing to pay 57% premiums for cage-free over conventional eggs. However, this substantial premium is paid only by a small minority of consumers. The extent to which a similar situation applies in USDA certified tender beef products is not clear but highlights issues regarding target versus mass marketing.
- Tonsor and Wolf (2011) provide a list of issues suggested for consideration prior to implementation of mandatory labeling policies regarding animal welfare practices. A comparable list applies to this situation including 1) the need for a devoted benefit-cost assessment of the proposed standard, 2) recognition that consumers have limits on the amount of retail product information they can and will process, and 3) recognition of tenderness being a complex and traditionally continuously measured attribute which is masked by discrete labeling.

Summary and Implications

This short document raises more questions than it answers which is consistent with the broader goal of providing context on several economic aspects worthy of further consideration concerning the proposed USDA-AMS certified beef tenderness standard. The substantial potential economic impact of this new standard, the multitude of unanswered questions which would influence the realized economic impact, and the core observation of multiple industry stakeholders being directly and indirectly influenced by any standard ultimately implemented underlie the desire of this discussion to motivate additional considerations prior to the proposed standard as outlined in the currently available draft document being implemented.

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