Back to Basics—Injection-Site Blemishes Are Still An Issue

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Introduction

During the late 1980's the National Cattlemen's Association began receiving numerous phone calls concerning the amount of trim and product loss from top sirloin butts. The complaints from packers and especially from retailers and steak cutting establishments indicated that trim loss was significant and increasing. They said, "[the problem is] getting out of control." Processors of the top sirloins were not aware of what was causing the problem. They often referred to the "defects" as "tumors in the meat."

Many of the steak cutters indicated that the problem was so serious in terms of economic loss that they were considering dropping top sirloins from their beef purchases. Some were seriously concerned that these defects posed a food safety threat.

The National Cattlemen's Association and beef industry leaders took this problem very seriously. In 1989, a Beef Quality Assurance Task Force was established to initiate a series of research studies to determine: 1) probable cause of top sirloin lesions or scars and 2) the overall magnitude of the problem.

Since early 1991, the Beef Quality Assurance program has been working aggressively to eliminate these blemishes. Millions of dollars are lost annually because of a problem that is easily corrected. The industry can and must resolve this problem by increasing the awareness that these "quality defects" result from "intramuscular (i.m.) injections" and that they can be eliminated through the implementation of an aggressive *Injection-Site Quality Control Initiative.*

Intramuscular Injection-Site Lesions

An Industry-Wide Problem

Intramuscular injection-site lesions and scars are a quality control problem not a food safety or public health threat. Injection-site lesions are an industry-wide problem (NCA/BQA, 1995) that:

- Raise quality control-management issues.
- Can be resolved by cattlemen and veterinarians.

Retailers and steak cutting establishments attempt to trim away these blemishes before they reach the meat counter, but they reduce the product value and represent a significant economic loss. There is also a concern that some defective tissue may be missed in the trimming process and find its way to the consumer's plate. Any successful industry must correct production flaws and optimize consumer satisfaction to remain competitive. Injection-site lesions or scars represent a quality flaw in beef production. Retail cuts of beef do not acquire injection-site abscesses, lesions and/or scar tissue at the processing plant, the restaurant or at the meat counter; **these defects result from incorrect practices on the farm and in the feedlot.**

It's Up to Us to "Fix" the Problem

The beef industry cannot afford to produce a product that contains "quality defects." No consumer will continue to accept a product which is inferior with respect to quality. Therefore, the beef industry cannot afford:

1. For the consumer to detect an injection-site lesion if one would happen to slip through the system.
2. For USDA inspection or retailers and purveyors to detect the problem.

Injection-site defects must be prevented at every segment of production - cow/calf, stocker, backgrounder and feeding (NCA/BQA, 1995).

Injection-site i.m. abscesses, lesions and scars are quality defects that cost our industry millions of dollars per year. These defects can be eliminated through intensive efforts by producers, veterinarians and animal health product manufacturers. Every cattle producer has a stake in fixing the "injection-site lesion problem."

Muscle tissue lesions and scarification can result from improper injection hygiene and technique as well as from the use of certain i.m. administered animal health products. Lesions can result from poorly placed injections given to animals at any age. Initially, it was thought that the injection-site lesion problem occurred primarily

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once cattle entered the feeding period. However, research now clearly shows that muscle damage (lesions and/or scars) can occur at any age during which the animal is given an i.m. injection that causes muscle tissue irritation. Intramuscular injections given to young calves (i.e., calfhood vaccinations, antimicrobials and even vitamin shots) that result in tissue irritation can cause measurable and visible scars when cattle are slaughtered at a typical market weight.

The results of the 1994 Non-Fed Cattle Quality Audit demonstrated that the incidence rate of injection site lesions in the "round muscle" area in carcasses of cull beef and dairy cows to be 28.4%. The industry's "injection-site" lesions and scar problem is prevalent throughout the industry *regardless of animal age.*

Injection-Site Audit "Top Butts"

In 1991, NCA's Beef Quality Assurance Task Force began quarterly top sirloin butt "injection-site" audits at selected major retailer and steak cutter establishments. The data from these audits help monitor the amount of progress the industry is making in reducing and, hopefully, eliminating top-sirloin injection-site abscesses, lesions and/or scars.

Usually 10,000 top sirloin butts are evaluated in each of the audits. The total number does vary depending on the number of top sirloins each establishment is cutting at a given period since seasonal variations do occur. Table A-1 show the results of the July 1995 audit. Despite intensive educational efforts by Beef Quality Assurance program coordinators, State Extension and University personnel, veterinarians and animal health product representatives, the level of injection-site blemishes remains at over 10% - an unacceptable level.

Table A-1. Top sirloin audit - July 1995

Top sirloins	14,610
Incidence rates of lesion/scars	10.2%
Average trim per lesion, oz.	5.4
Fluid filled lesions	9
Fluid filled lesions	0.06%

Impact of Calfhood Intramuscular Injections on the Incidence of Lesions (1993 Research Study)

Often cow/calf producers assume that the injection-site lesion and scarification problem results from i.m. injections given to cattle in the feedlot. Initially, it was thought that injections given at weaning time had little impact on the overall occurrence of injection-site lesions or scars when cattle are slaughtered at a typical market weight. A 1993 Colorado State University study was conducted to determine if calfhood i.m. injections result in tissue damage and trim loss when cattle are slaughtered at a typical market weight.

Injections at Branding and Weaning Caused Blemishes

Results of a 1993 Colorado State University research study revealed high incidence rates of tissue scarification resulting from i.m. injection of various injectable products administered at either branding or weaning. All injections were administered at product label recommended dosage levels. The calves were administered in the *semimembranosus* (inside round) muscles at branding and the *biceps femoris* and *gluteus medius* (top sirloin butt) muscles at weaning. The results were based on a total of 42 injections per product per period (branding and weaning). At slaughter, 82.7% of the cattle graded Choice or better. Even though i.m. injections of Vitamins A and D caused the lowest incidence of muscle lesions and/or scars, they still were shown to be contributing to the industry's overall injection-site muscle scarification problem. Quality defects resulting from Vitamins A and D i.m. injections resulted in significant muscle trim loss. Results of the study are indicated on Table A-2 where Table A-3 shows the average trim loss per injection-site blemish observed in the 1993 Colorado State University i.m. calfhood "injection-site" study. The trim loss data represents the average ounces of trim per lesion and/or scar.

Table A-2. Blemishes resulting from i.m. injections at branding and weaning.

Product type	Dose	Blemish incidence	
		Branding	Weaning
		---------- % ----------	
Clostridial	2 ml	72.5[a]	46.3[a]
Clostridial	5 ml	92.7[b]	49.5[b]
Vitamin AD_3	1 ml	5.3[c]	10.0[c]
Antibiotic	4.5 ml/100 lb	51.2[d]	92.3[b]

[a,b,c,d]Mean scores within a column without a common superscript differ (P<. Days of age: (branding = 50; weaning = 200; slaughter = 430)

Colorado State University, 1993

Table A-3 Trim from injection-site blemishes resulting from i.m. injection branding and weaning.

Product type	Dose	Trim per blemish	
		Branding	Weaning
		---------- % ----------	
Clostridial	2 ml	1.7[a]	1.1[a]
Clostridial	5 ml	3.0[b]	2.4[b]
Vitamin AD3	1 ml	2.7[ab]	1.9[ab]
Antibiotic	4.5 ml/100 lb	3.7[b]	3.1[b]

[ab]Mean scores within a column without a common superscript differ (P<. Days of age: (branding = 50; weaning = 200; slaughter = 430)

Colorado State University, 1993

The Colorado State University study clearly demonstrates that lesions and blemishes result from i.m. injections given to calves at branding and weaning. Defects resulting from clostridial, antibiotic and Vitamin A and D injections were visible for as much as 380 days after administration.

Products used in the study include a Clostridial 7-Way product, Vitamin A and D and a well known antibiotic (antimicrobial) administered when the calves were 50 days of age (at branding). The results of this study demonstrate that i.m. injection of Vitamins A and D products also contribute to the industry's overall injection-site quality defect problem.

Injection-Site Subcutaneous "Knots"

Injection-site subcutaneous (s.c.) surface "knots" have become an increasing problem throughout the industry. The beef industry, through the efforts of the Beef Quality Assurance program, has actively encouraged the administration of injectable animal health products in anatomical locations other than in muscle tissue if the alternative routes of administration are specified on the product label. Consequently, more producers and veterinarians are administering injectable products s.c. in the neck or front shoulder region of the animal's body. Some injectable products do, under certain situations, cause the development of a knot or swelling at the injection-site.

In most cases, these "knots" regress and disappear after a few days or weeks. However, there are cases where these "knots" persist for a longer period of time.

There are situations where cattle producers have received "price discounts" (price docks) when these calves or cattle are marketed in the normal marketing channel. NCA's Beef Quality Assurance Task Force has developed a position statement relative to this problem. Subcutaneous injection "knots" should not be a pricing discount issue since:

1. They are not a defect to the hide, carcass or other salable product.

2. They are of no concern to the health and quality of the animal.

3. They indicate that the animal has been vaccinated (a practice to be encouraged) and that the vaccination response has not been impeded.

The NCA's Beef Quality Assurance Task Force encourages all individuals buying feeder and/or finished cattle to make every effort to see that any such surface vaccine blemishes (knots) are NOT noted as a value discounting issue (NCA/BQA, 1995).

Subcutaneous Injection "Knots" Should Not be a Pricing Issue

The NCA's Beef Quality Assurance Task Force position statement, relative to injection-site s.c. surface "knots," pose no concern to the health and quality of the animal, and it is unjustified to use the presence of these "knots" as an excuse for pricing discounts of cattle.

All individuals buying feeder and/or finished cattle are encouraged **NOT** to use surface vaccine blemishes (knots) as a discounting issue. Some cattle producers consider the presence of these "knots" as a positive sign that the calves and cattle have had their appropriate vaccinations, and they are assured that these blemishes are not buried in the muscle tissue where packer billbacks could potentially result when such cattle are slaughtered. Remember! "When calves have knots, you know that they got their shots!"

Injection-Site Lesions and Scars Affect Muscle Tenderness

Can an injection blemish affect the eating quality of the surrounding muscle tissue? Injection-site lesions and scars affect muscle tenderness. Retailers and steak cutters usually trim out the visible portion of the scar and/or lesion, but has the eating "quality" of the surrounding muscle tissue been affected?

Shear-Force Determination

Colorado State University (1994) conducted a research study to determine the effects of tissue damage resulting from i.m. injections in the "muscle of the round" on the tenderness of the cut of meat as determined by Warner-Bratzler shear force values. Core samples of muscle tissue were collected 1, 2 and 3 inches from the visible location of the injection-site lesion/scar and evaluated for muscle fiber tenderness.

Warner-Bratzler Shear Values of Injection-Site Lesions Taken from the Round

Research data from a Colorado State University study (1994) show the effects of tissue damage resulting from i.m. injections in the round on muscle tenderness. The results of this study prove that muscle tenderness is **significantly reduced** for an area of at least 3 inches on each side of the visible area of the injection-site lesion or scar. A commonly used i.m. pharmaceutical was employed in this study. Results of this study reveal a highly significant increase in Warner-Bratzler shear force values in cooked steaks that extend outward up to 3 inches from the center of a lesion when compared to shear force values for normal round steaks. Muscle shear force values greater than 10 are indicative of unacceptable muscle tenderness. In other words, beef resulting from tissue around the injection site lesion is likely to be considerably "tougher" than normal tissue.

Beef Quality Assurance-Product Administration Policy Statement

In 1994, NCA adopted a policy resolution establishing an industry position relative to animal health product administration. Injection site location recommendations are as follows:

1. Recommended that all clostridial bacterins be given s.c. in the neck region preferably using the "tented" technique.
2. Recommend that, after the primary immunization with Clostridial bacterins, repeat or multiple injections be discouraged especially late in the feeding period.
3. Recommended that i.m. injections for all products be avoided whenever other "labeled" routes of administration are available.
4. Encourage biological and pharmaceutical manufactures to provide tissue reaction data on all injectable animal health products.

This resolution encourages cattle producers and veterinarians to request (demand) tissue reaction data from pharmaceutical and biological (vaccine) manufactures and suppliers. It is the responsibility of the injectable product suppliers to provide this type of information to their customers-cattlemen and veterinarians.

Beef Quality Assurance Task Force - Injection-Site Location Recommendations

In early 1991, NCA's Beef Quality Assurance Task Force developed "Injection-Site Location" guidelines and recommendations to be adopted and implemented by cattle producers and veterinarians throughout all production sectors of the industry (AH - 55, January 1994: NCA/BQA, 1995):

1. Products used at any time during the production system and that cause damage to tissue are UNACCEPTABLE.
2. To provide a quality "blemish-free" product, products, products cleared for s.c., intravenous (i.v.) or oral administration are recommended.
3. Products with low dosage rates are recommended.
4. Products cleared for i.m. administration must be supported with sufficient research data demonstrating an absence of tissue damage.

These guidelines and recommendations were developed as part of an industry-wide strategy designed to reduce and eliminate the occurrence of "injection-site" abscesses, lesions and scars from occurring in the higher-priced, sub-primal cuts of beef.

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Every Cattle Producer and Veterinarian has a Responsibility

The attitude that it is "someone else's problem" will not fix the beef industry's injection-site lesion and scar problem. Each and every time an animal is given an injection for whatever reason, one has to be cognizant of how that particular injection could affect the "quality" of the product being produced - beef for the consumer's dinner plate!!!

The injection-site problem is a **management issue.** It can be and has to be resolved by cattle producers and veterinarians. It is up to each of us to "fix" the problem by using correct practices at home and by sharing this information with our fellow cattle producers and veterinarians.

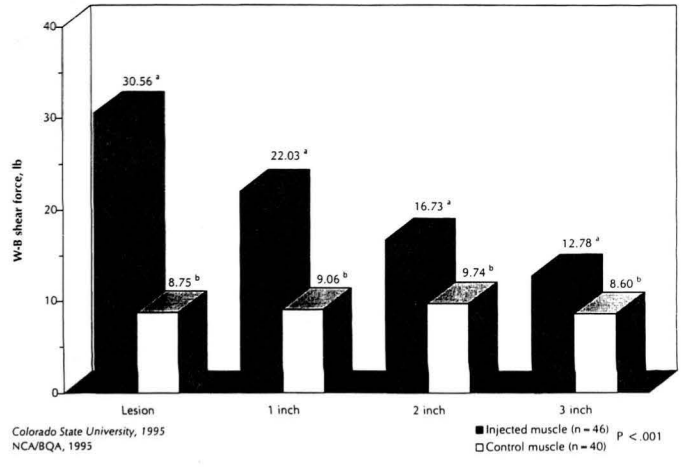

Chart A-2 Injection-site lesions ~ round (Warner-Bratzler shear values).