Quality Assurance & Residue Avoidance in Midwest Feedlots

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Introduction

Feedlot Drug Testing-Challenge of the 90's - Residues of drugs in food producing animals is presently one of the greatest challenges facing the cattle industry. While assessing the *actual* issue of drug residues as needs arise, a still larger task of addressing the *perceived* need of the consumer, as media misconception, and purposeful negativity by animal welfarists (of which the veterinary profession is an active part). Thus the ultimate goal of the beef industry, therefore, must be to make quality assurance & beef safety a "non-issue" by generating a positive image & maintaining consumer confidence.

In recent years the beef industry has generally been both aided & damaged by developments both internationally and at home:

Positives (or at least non-maligned)
-Negativity in poultry industry hygeine
-Sulfa residue in pork
-Quality assurance & regulation of seafood industry
-Innovative "first step" assurance programs (Hitch Agreement)

Negatives:
-Zeraleone toxicity in Puerto Rico (implant comparison)
-Bulk drug controversy & illegal drug use (Schyler)
-FDA "sting operations" involving RX only drugs
-Recent EEC ban
-Negativity in veal production/residues
-Sulfa residues in milk (allowable levels & CHARM test)

As perceived consumer needs and actual industry needs are met and addressed, the veterinary profession faces a dramatic change in the attitude and mechanics of assessing criteria for both prophylactic and therapeutic use of drugs and the potential for residue. The role of the veterinary consultant in the feedlot operation may allow an excellent opportunity to objectively assess the meat residue issue and implement programs that stress residue avoidance, as well as developing testing methods that are concise & reliable.

Roles of the Veterinary Consultant

The feedlot veterinary consultant must assume many roles in order to implement a successful quality assurance/residue avoidance program. These include:

Supervisor

In order to assess drug residues consistently & effectively, the veterinarian must be firmly entrenched and familiar with the total working mechanics of the feedlot environment. Full understanding and supervision of all aspects of animal/drug handling, administration & usage of products are required. Thus monitoring arrival, processing, and treatment, as well as meticulous record keeping in use of ALL drugs must be shared between veterinarian, management and technical personnel (cowboy). The right hand must always know what the left hand is doing to avoid inconsistencies and discrepancies in drug usage. Veterinary training in physiology, biochemistry, and pharmokinetics will allow expert assessment of the many variables of drug distribution, thus providing objectivity in predicting drug residue potential.

Instructor

For decades the veterinary profession has instructed cowboys, ranchers, farmers, and producers in the proper administration of drugs-almost to a fault in lieu of the emergence of the successful OTC industry. We, as a profession, have effectively lost control of drug usage in the animal industry because of one glaring fact-we've taught "Cowboy Bob" how to use a syringe, but not necessarily how to use it responsibly! The veterinarian will thus be responsible for the instruction of the proper mode of drug administration, sample collection, and data processing. It is critical that the ultimate role of DATA INTERPRETATION be maintained by the veterinary profession for two reasons: (1)Assure validity of results
(2) Maintain active regulatory control
This allows the profession to maintain an integral role in the system, and project a positive image of responsibility to the consumer. Presently, many states are exploring the possibility of technician certification programs to assess residue avoidance, and the veterinary profession will be forced to address this issue and respond in kind.

Regulatory Liaison

Every accredited veterinarian is acutely aware of the

enormous burden of responsibillity that encompasses federal/state regulation. As choices are made by the consultant as to when, how, and why medications are used, the sole responsibility for monitoring potential drug residues becomes his/hers. Since an obvious doctor-client relationship exists, the added dimension of extra-label drug usage must be addressed. The monitoring of a drug that is unapproved for the species in which it was designed, as well as unestablished slaughter withdrawal times, present an exciting and fundamentally vital challenge to the veterinary consultant to provide necessary care to the patient vs. consumer safety. An absolute essential for recommendation of an extra-label drug is inarguable justification through a complete diagnostic workup that supports and mandates its use. If an extra-label drug cannot be shown as superior to an approved drug through records, histories, and diagnostic results, it should not be first choice, despite the temptations of convenience and cost. It is imperative that the veterinary consultant create & maintain a squeaky-clean image to all parties, especially with the recent negative imagery that has accompanied the reports of illegal bulk drug use & misuse of Rx only products. The preparation and mixing of bulk drugs for animal use simply has no place in a serious Residue Avoidance Program.

The relationship between USDA officials and veterinarians has been recently clouded by mistrust, animosity, and bad publicity. This must change to create an acceptable working rapport that is necessary to make Beef Quality Assurance a valid and successful endeavor. Consult the state/federal officials in your area on matters that concern you. It will be a learning experience for both parties.

Veterinarian: Client Role in Midwest Feedlots

There are some excellent opportunities for the role of the veterinarian in residue avoidance programs in this area, as it applies to the 10,000 head and under operation. These are enhanced by many factors, which include:

1) LOT SIZE - lower actual numbers equate into less voluminous record keeping, increased attention to cattle, decreased # hired labor/head of fed cattle, and generally less inconsistencies.

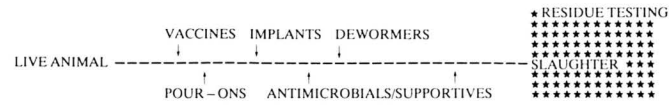
2) FAMILY FARM (LIMITED INVESTOR) CONCEPT - not only are labor numbers less, but turnover rates are lower due to cohesiveness in business and less variables in the decision making process. Functional roles are intact.

3) CLOSER VETERINARIAN CONTACT - many of these operations place the veterinarian in the role of processing and treatment, as well as health consultant. This is an advantageous area for reliable recording of ALL drugs that are administered to the animal from arrival to slaughter through a single source. An increased confidence level in the veterinarian exists.

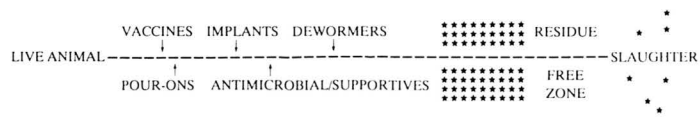
Thus the veterinary consultant can assess & implement quality assurance programs DIRECTLY due to providing a technical service, as well as a consultive and supervisory role.

Drug Testing Programs

Present programs still rely heavily on slaughter testing with a "hold your breath" mentality. This can be represented by the following schematic:



In preslaughter drug testing programs, on the other hand, residue testing concurrent with strict record keeping & exact target animal ID helps create a reliable buffer zone where a preslaughter time frame exists that provides a residue free zone that relies on slaughter residue testing as only a check and balance system to insure credibility.



Preslaughter Drug Testing (PSDT)

A successful residue program must be a combination of specific target animal evaluation, randon group testing, exacting record keeping, and random post-slaughter exam. Any valid program must have ample checks & balances to establish absolute, inarguable results. The usual testing mode to date is a combination of Live Animal Sensitivity Testing (LAST) and the Swab Test On Premise performed at the slaughter plant. Requirements for the success of PSDT are numerous, and include:

-smooth integration into normal feedlot operating routine with minimal disruptions.
-indisputably accurate records
-credible 3rd party interpretive source (veterinarian)
-establishing & maintaining a positive image to both the beef industry and the consumer

LAST programs must be evaluated closely to establish acceptable criteria for use. Thus, many of the pitfalls can be understood to avoid interpretive error or overemphasis of subjective data. The test concept is based on the procedure in which a test sample (urine usually) is exposed to the normal growth pattern of a nonpathogenic bacteria upon incubation. The capacity of any sample to alter or retard this normal growth would indicate the prescence of

a substance within the sample that is currently being excreted, usually an antimicrobial that was introduced into the animal as a means of controlling a disease process. Objective pro's and con's of this test include:

PRO's
-Individual animal ID
-No "favorite son" selective testing
-Evaluated ALL antimicrobial activity

CON's
-Requires animal restraint
-Many external variables (feed, water, feces, spec. gravity)
-Limited target organ & excretion route (renal)
-Human error (credible results require credible sampling & interpretation)

Actual LAST procedures may require modifications to be realistically accomplished in the feedlot environment. It would be great in theory to collect a mid-stream urine sample in an aseptic manner, but this is difficult in practical application. Even with good restraint, animal resistance & contamination is still a factor. Conversely, constant monitoring of penned cattle will not be tolerated by management due to high labor expense, as well as finding a cowboy willing to trail a calf all day with a Dixie cup! From a feasibility standpoint, three methods of collection exists:
-Midstream urine sampling
-SWAB of preputial/vulvulourethral area
-Post-mictural collection (PMC)

Collection technique must stress clean sanitary conditions, and resist the concept that "one fecal coliform isn't gonna hurt", since minor contamination through air, water, feces, and skin is unavoidable. But in a true diagnostic & professional sense, lackadaisical, half-hearted collection techniques cannot be tolerated or the validity of the entire program suffers. True acceptable technique lies between asepsis and syringing from a 2-hour old urine puddle.

Records and data assimilation are inarguably the singlemost important aspect of a Residue Avoidance Program. The compiling of data must cascade smoothly through a record system as follows:

ARRIVAL LOG--PROCESSING LOG--INDIVIDUAL TX--WEEKLY MORBIDITY & MORTALITY LOG

automatic recall QUARTERLY/ANNUAL
PSDT- -
system MORB/MORT. LOG

Individual animal treatment card must record exact animal ID number, disease code, drug information (name, amount & route). In addition, a "notch" system may be incorporated to aid in easy identification, as follows:

non-pull (non-treatment) 1st pull 2nd pull multi-pull

Once pulls are recorded, they are placed in an automatic recall system that identifies these animals/groups in 75 days, which correlates to normal handling at reimplanting, or allows 30 days pre-slaughter on terminal handled cattle. Thus normal feedlot procedure is not interrupted nor extra handling of cattle a factor. ALL drugs are evaluated through record, although antimicrobials are targeted. Extra-label drug use & problematic groups are especially scrutinized. This time frame appears adequate.

What's Ahead?--The Philosophy of Change
--Enhanced Diagnostics
--Advanced Ante-Mortem Collection

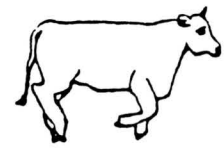
The greatest challenge facing the cattle industry as well as the veterinarian will be modifying the ways of cattle handling, processing, and treatment that have existed for decades. Increased awareness of animal welfare & comfort, as well as responsiveness to consumer concerns, loom as an issue that mandates addressment. Some other considerations that merit review today also include:

-CHOOSING THE "LEAST" INVASIVE MODES OF PROCESSING/TREATMENT
this includes designing programs that avoid excessive injections that require residue awareness and cattle comfort. Segmental processing is an alternative.
TOPICAL--ORAL--SC--IM--IV

-CHOOSING THE "LEAST" INVASIVE SITE-AWARENESS OF THE FINAL MARKETABLE PRODUCT
this includes avoiding ALL prime cut areas of any invasive techniques (only puncture marks in meat should be the consumer's fork). Also designing injection protocol that emphasizes ANTERIOR techniques.

-EQUIPMENT CARE & HANDLING
this includes increased awareness of sanitation that emphasizes frequent needle change, needle dips, and automatic refill systems that minimize environmental contamination.

-IMPLEMENTING PSDT INTO NORMAL PROTOCOL OF FEEDLOT PRODUCTION
this includes transforming drug testing from a

BEEFMAN 

Health Consultants

PRE-SLAUGHTER DRUG TESTING

Date: _____

Pen: _____

Procedure Used: _____

Type of Test: _____ Random Group

_____ Individual

ID Tag # _____

DATE OF LAST TREATMENT

Parenteral _____

Feed _____

Other _____

Reason for Treatment _____

_____

TYPE OF SAMPLE:

Urine _____

Serum _____

Tissue _____

Other _____

SAMPLE TAKEN BY: _____

RESULTS INTERPRETED BY: _____ LOCATION _____

ATTENDING VETERINARIAN _____

RESULTS: Residue-Free _____

Non-Residue Free _____

NEXT SCHEDULED TEST: _____

"I hereby state that to the best of my knowledge that the above procedure was performed within the guidelines established and the corresponding results are accurate and correct..."

_____

_____

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slaughter plant/chronic cull concern into a daily routine that is acceptable as is processing, feeding, and marketing of feedlot cattle.

Enhanced Diagnostics

Presently, an array of new diagnostic products have been approved for aiding the diagnosis of small amounts of specified drug, chemicals, and toxins. These list the concept of identifying antigen:antibody complexes and recording this response (usually ELISA or cup test). These tests are quick, reliable, and very specific. They can be performed on a number of target areas including feed, serum, urine, milk, and tissue. This can aid in targeting residues that evade detection by LAST procedures, and opens another area of diagnostic consideration previously unavailable. These tests will allow for specific testing of all residues as each test source is developed. An added advantage of these tests is that serial dilutions allow for minimum cutoff levels which avoid the "all or nothing" concept that plagues both the LAST, and recently the CHARM test, that does not address the USDA interpretation of minimal allowable levels.

Advanced Ante-Mortem Collection Techniques

In utilizing present testing methods at the feedlot in the live animal, a glaring misconception of total residue avoidance must be addressed. The specific target organ & excretion route employed hinges upon the renal system, and thus only applies to substances that are metabolized or excreted as a result of nephron filtering. Other chemicals that may rely upon other routes of excretion (liver) or "hang up" in other tissues in the body (i.e. fat) may not be detected. The range of testing for specific chemicals is extensive, and new techniques for sampling in the live animal need development. These will include:

-MUSCLE tissue collection - at injection site (biopsy) or by random sampling (tail resection).
-FAT tissue collection - lateral periorbital or tailhead.
-LIVER tissue collection - liver biopsy.

Only by addressing ALL potential residue sources can a Residue Avoidance Program merit the validity required. Other areas of antemortem testing will evolve as new testing areas develop.

Conclusion

In closing, the goals of a successful Quality Assurance Program for the beef industry must attain a complex level of irony by satisfactorily convincing the cattle industry that such programs are necessary--while also soothing and placating the consumer that such programs are so reliable as to minimize the safety issue focus. These goals must address:

-An efficient, qualified program to detect tissue residue.
-Provide data that satisfy the perceived needs of the consumer while projecting a positive image.
-Provide cost-effective models of implementing drug testing.
-Provide data that demonstrate an actual need to the beef industry that such programs are feasible, reliable, and beneficial.
-Provide expertise in collection, recording, and interpretation of data to attain program credibility.

Ultimately the confidence of both the consumer sector & the beef industry must be attained to project a reliable quality assurance of beef.

Selected References

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