Large Animal Biologics, Antibiotics, and Hormones: Understanding Their Risks and Safe Use

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Topics

• Introduction
• Veterinary Biologicals (immunizing products)
• Antibiotics
• Hormones (growth or obstetrics)
• How Do I Prevent Injuries When Working With These Products?

Risk Management Agency (RMA)
Introduction

- Biologicals - products derived from living organisms to immunize, treat, or prevent disease (includes antisera, bacterins, vaccines, toxoids, and antitoxins)
- Antibiotics - used to cure, treat, or prevent disease
- Hormones - substances made in one part of the body to affect another part (includes oxytocin and prostaglandins)
Introduction

• Why do we use these products?
  – Treat-restore health in sick animals (“therapeutic”-primarily individual)
  – Control-reduce group disease (“metaphylactic”-primarily group or herd)
  – Prevent-keep animals healthy either individually or as a group (“prophylactic”)
  – Production-improve healthy animal efficiency either individually or as a group (“subtherapeutic”)
## Introduction: Delivery Methods and Human Risks Associated with Each

<table>
<thead>
<tr>
<th>MODE (Examples)</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
<th>HUMAN RISKS (Worker vs. Consumer)</th>
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<td>INJECTABLE (antimicrobics, mins/vits, wormers, hormones)</td>
<td>Quick Targeted Indiv’s EZ Identification Dose/Timing Known</td>
<td>Stress Tuff for Large #'s Trained Labor Tissue Damage/Blemish Broken Needles</td>
<td>Injured by Animal Needle Sticks Inflammation Allergies Residues</td>
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<tr>
<td>ORAL (wormers, GI motility)</td>
<td>Quick Targeted Indiv’s EZ Identification Dose/Timing Known</td>
<td>Stress Tuff for Large #'s Trained Labor Lo Appetite Post-TX</td>
<td>Injured by Animal Dermal Exposure Bites Residues</td>
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<tr>
<td>FEED/H2O (antimicrobics, mins/vits, grow enhancers)</td>
<td>EZ On Large #'s Target Groups Lo Cost EZ for DZ Prevention</td>
<td>Long Response Time Variable Intake Increased Residues Must Clean Out To Stop TX</td>
<td>Respiratory/Dermal Residues</td>
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<tr>
<td>POUR ON (parasiticides)</td>
<td>EZ On Large #'s Target Groups Lo Labor and Costs</td>
<td>Stress Variable Dosing Weather Problems Via Licking</td>
<td>Injured by Animal Respiratory/Dermal Eye/Membrane Residues</td>
</tr>
</tbody>
</table>
Introduction

• Who is at risk?
  – Livestock producers
  – Farm workers/employees
  – Veterinarians
  – Veterinary assistants
  – Downstream: consumers (residues, antibiotic-resistant bacteria)
Veterinary Biologicals

• Antisera—protein product that provides immediate short term passive immunity (i.e. BoviSerum® or Respiragen® serum)
• Bacterins—killed bacterial product with adjuvant (usually an oil) that produces active immunity (i.e. E.coli bacterin)
• Vaccines—usually contain modified live or killed bacterial or viral agents to produce active immunity
  – when live or modified live agents are present, may cause disease in human when accidentally injected
Veterinary Biologicals

• Toxoids-inactivated toxins (i.e. tetanus toxoid) that produce active immunity
• Antitoxins-type of antisera given to produce short term passive immunity (i.e. tetanus antitoxin)
• Inadvertent injection of any of the above into a human can result in a health consequence
Veterinary Biologicals

• How Can Injected Biologicals Hurt You?
  – Infection/trauma from needle alone
  – Infection from injected product (i.e. Brucella abortus strain 19 or RB51 vaccine)
  – Inflammatory reaction from injected product (i.e. Johne’s disease vaccine or E.coli bacterin)- usually from the adjuvant portion of the vaccine
  – Hyperimmune reaction from injected product if there has been a previous exposure (i.e. previous exposure to Brucella)
Antibiotics

• Why are they used on the farm?
  – Treat disease, prevent disease, promote growth

• What types of antibiotics are used?
  – Beta-lactams (penicillins, amoxicillin, cephalosporins-Naxcel®)
  – Aminoglycosides (gentamycin, neomycin, streptomycin)
  – Fluoroquinolones (enrofloxacin-Baytril®)
  – Macrolides (erythromycin, tilmicosin-Micotil®, tylosin)
  – Tetracyclines
  – Sulfonamides
  – Phenicols (florfenicol-Nuflor®)
  – Lincosamides (lincomycin, clindamycin)
Antibiotics

- Antibiotics commonly used for
  - Mastitis-cephalosporins
  - Lameness-tetracyclines, phenicols
  - Respiratory disease-cephalosporins like ceftiofur (Naxcel®)
  - Gastrointestinal disease-cephalosporins and sulfas

- Each antibiotic delivered by different mode for different disease with different human health risk
  - Mastitis-intramammary, intramuscular
  - Lameness-topical, intramuscular
Antibiotics

• How Can These Antibiotics Hurt you?
  – Infection/trauma by contaminated needle when inadvertently injected
  – Allergic reaction through direct contact (contact dermatitis), aerosol exposure (medicated feeds), or injection
    • Consumers may also have reaction when milk or meat residues are present
  – Antibiotic-resistant organisms develop in the gut of animals and can also develop in the gut of people who work with these animals
    • Consumers may also be affected through bringing contaminated items home as well as through environmental contamination (manure on fields, runoff into water, exhaust air from production facility)
Antibiotics

• Tilmicosin (Micotil®) Injection
  – Safe for cattle use, potentially fatal in humans
  – Accidental injection or splashes onto face/into eyes can result in pain, swelling, burning sensation, cardiovascular toxicity, possibly death due to rapid and irregular heart beat
Hormones

• Growth promotants
  – Estrogens and progesterones-market fattening, enhance flavor due to increasing ‘marbling’
    • Given to feedlot cattle as a time release pellet implant on outside of ear
  – Growth hormone (primarily somatotropin)-increases milk production
    • Must be injected every 14 days during lactation
Hormones

• Veterinary Obstetrical Hormones
  – Oxytocin – Used to increase uterine contractions and cause milk let-down
  – Prostaglandins - Used to terminate an early pregnancy, to induce parturition in later pregnancy, or induce estrus
  – Accidental injection of either of the above can cause abortion in pregnant women
How Do I Prevent Injuries When Working With These Products?

• Have properly designed and maintained animal handling facilities
  – Ramps/chute system-solid sides
  – Adequate light, ventilation, and space
  – Adequate animal access for what needs to be done-decrease chance to entrap arm, hand, or other body part between animal and pen
  – Floors/walkways are slip-free (no manure or urine) and appropriate height to work
How Do I Prevent Injuries When Working With These Products?

• Have adequate and trained assistants in cattle behavior, movement, and restraint
  – Never work alone!
  – Knowing and understanding the temperament and behavior of the cattle will facilitate their movement and manipulation
  – Be sure employees know how to work pens, chutes, and head restraints properly
  – Proper restraint will decrease the incidence of broken needles left in the animal or unexpected animal movement that leads to a needle stick injury
  – Be alert to cattle movement and have a designated escape route if necessary
How Do I Prevent Injuries When Working With These Products?

1) Be aware of the flight zone for cattle. To move cattle forward, move toward their rear past their point of balance (shoulder). To stop or back up cattle in a chute, move forward past their point of balance.
2) Never fill a crowding pen more than three quarters full; cattle need room to turn around.
3) Cattle should move easily up the chute. Avoid hanging chains, shadows, backstops, noises, dogs, or people that might prevent movement.
4) Loading ramps and handling chutes should have solid walls to prevent animals from seeing distractions outside the working area.
5) Minimize the use of electric cattle prods.
6) Reducing stress on the animal will reduce
   • animal injuries and sickness, employee injury
   • and increase overall efficiency.
How Do I Prevent Injuries When Working With These Products?

• Wear appropriate personal protective equipment (PPE)
  – Safety glasses to prevent eye splashes
  – Safety shoes or boots (steel-toe preferred)
  – Gloves, respiratory protection (mask or respirator), and non-absorbent coverall may be recommended when aerosol or skin exposure might be a problem (medicated feeds, some dewormers)
How Do I Prevent Injuries When Working With These Products?

• Select the safest injectable products possible
  – Use killed vaccine products when possible
  – Use an alternative to tilmicosin when possible
  – Pregnant employees should be counseled on the hazards of oxytocin and prostaglandin use
    • May be best to have a non-pregnant employee handle and inject these drugs
How Do I Prevent Injuries When Working With These Products?

- Provide information and training on products used on the farm
  - Keep a log, notebook, or file of material safety data sheets (MSDS) and product package inserts
    - This will allow information to be taken with the employee in the event of an exposure or incident
  - Follow package or veterinary instructions for use
  - Have accessible to employees and provide regular training on use and hazards
    - Especially important with new employees and new products
  - Have a translator available if English is not the first language of all employees
How Do I Prevent Injuries When Working With These Products?

- Train employees on safe injection techniques
  - Use the right needle size (length and bore diameter) depending on the size of the cattle, route of injection and the substance to be injected
  - Change needles frequently (usually by 10-15 injections) - dull or burr increase chance of needle injury or infection
  - Change needles immediately when bent, damaged, burred
  - Know the landmarks for IM and SQ injections
## How Do I Prevent Injuries When Working With These Products?

<table>
<thead>
<tr>
<th>Injection Viscosity</th>
<th>SQ ½ to 1 inch needle</th>
<th>IV 1 ½ inch needle</th>
<th>IM 1 -1 ½ inch needle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thin (i.e. saline)</td>
<td>18g</td>
<td>18-16g</td>
<td>16g</td>
</tr>
<tr>
<td></td>
<td>18-16g</td>
<td>16g</td>
<td>16g</td>
</tr>
<tr>
<td>Thick (i.e. oxytetracycline)</td>
<td>18-16g</td>
<td>16g</td>
<td>16g</td>
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<tr>
<td></td>
<td></td>
<td>16-14g</td>
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<td></td>
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<td>16g</td>
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<td></td>
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<td>16g</td>
</tr>
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</table>

**SELECT THE NEEDLE TO FIT THE CATTLE SIZE (THE SMALLEST PRACTICAL SIZE WITHOUT BENDING)**

- g=gauge of needle
How Do I Prevent Injuries When Working With These Products?

– Use an appropriate SQ injection technique based on the hazard level of the substance injected or for safety of the injector
  • One handed method for live vaccines or when unsafe to use both hands
  • Two handed method for killed vaccines
  • In general, one handed method safer than two handed
– Don’t place your hands between the animal and the stall/chute/restraint when injecting
– Consider using a needleless injection system
– A styrofoam cooler can be used to protect employees from a sharps injury and vaccine from heat damage
How Do I Prevent Injuries When Working With These Products?

Two-handed method

One-handed method

Keeping needles protected and vaccine cool
How Do I Prevent Injuries When Working With These Products?

- Train employees on safe sharps handling and disposal procedures—have a written procedure
  - One dose/one syringe (or safe multi-dose injector)
  - Keep needle capped until use and don’t remove cap with mouth
  - No loaded syringe in mouth or pocket
  - Do not recap needles
  - Have puncture-proof sharps containers in areas where sharps are used and all sharps go in these designated containers (not trash)
How Do I Prevent Injuries When Working With These Products?

• Have a written plan or procedure in place for when an injury or incident happens
  – Make sure employees immediately report an injury or incident to a supervisor
  – Make sure employees are trained and know what to do
  – Make sure employees have current tetanus vaccination (prior to or as a requirement of employment)
  – Document individual injuries
    • Frequency may dictate need for further training or retraining
How Do I Prevent Injuries When Working With These Products?

– Immediate first aid steps-always err on the side of caution!
  • Simple skin exposure-wash immediately with soap and water, seek medical advice
  • Mucous membrane exposure (mouth, eyes)-flush copiously with water, seek medical advice and/or attention
  • Simple needle stick without injection of pharmaceutical-allow to bleed, wash with soap and water, seek medical attention-may require antibiotics, steroids, tetanus vaccination
  • Needle stick with injection of pharmaceutical-as above, but may require surgery if oil-based vaccine injected or extensive antibiotic treatment if live agent injected
  • Take the product package insert/MSDS to the health care provider to facilitate treatment
How Do I Prevent Injuries When Working With These Products?

- Consult your veterinarian prior to using pharmaceuticals
  - S/he can determine what, if any, treatment is necessary
  - S/he can determine the safest treatment and route of administration
  - S/he can offer education and training in the safe use and administration of pharmaceuticals
  - S/he can provide information on personal protective equipment and general safety information including facility design
- May also be able to provide PPE or “steer” you where to obtain it
How Do I Prevent Injuries When Working With These Products?

• Consider the downstream (consumer) effects of pharmaceutical use (residues, antibiotic-resistant organisms)
  – Follow veterinarian or package instructions for use
  – Observe the appropriate withdrawal time for the product
  – Use antibiotics only when necessary
  – Consider not using antibiotics in feed
How Do I Prevent Injuries When Working With These Products?

• Consumer Reports article

• “An ounce of prevention is worth a pound of cure.”