




**Antibiotic and Hormone Use
in Livestock Production**

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Presentation Outline

- **Antibiotics and Hormones**
 - a. How they are used
 - b. Quantities used
 - c. How they work
 - d. Effects



1a. How are antibiotics used in livestock production?

- **Therapeutically**
 - Higher doses, shorter periods
 - Used to treat specific diseases
- **Subtherapeutically**
 - Lower doses, longer periods (usually)
 - Used to prevent infections, limit subclinical infections, improve growth rates
 - Been in practice since the 1950's



1b. Quantities of antibiotics used in livestock production

- ~25 antibiotics are approved for use in livestock
- How much?
 - **Animal Health Institute (2000)**
 - 18 million pounds used in beef, dairy, swine, and poultry production
 - 83% for the treatment of specific diseases
 - **Union of Concerned Scientists (2001)**
 - 25 million pounds for subtherapeutic uses alone
 - 21 million pounds used in swine and poultry production

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1c. How they work

Benefits of subtherapeutic antibiotic use:

- 1. Disease Prevention**
 - a. Prevent clinical disease
 - b. Prevent subclinical disease
- 2. Other Health Benefits**
 - a. Improve gut health
 - b. Improve microbiological populations
 - Increase nutrient absorption

Result: increased feed efficiency and increased average daily gain = more rapid and efficient growth

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1d. Effects of in-feed antibiotic use

Swine	Ab-	Ab+	%diff
Starter Phase (<25Kg)			
Daily gain (Kg)	0.39	0.35	+16.4
Feed/gain	2.28	2.13	-6.9
Growing Phase (17-49Kg)			
Daily gain (Kg)	0.59	0.66	+10.6
Feed/gain	2.91	2.78	-4.5
Growing/Finishing Phase (24-89Kg)			
Daily gain (Kg)	0.69	0.72	+4.2
Feed/gain	1.5	1.47	-2.2

Adapted from Cromwell et al., 1999

1d. Effects of in-feed antibiotic use

Production Benefits of Including Antibiotics in Feed		
Livestock Species	Growth Rate (%improvement)	Feed Efficiency (%improvement)
Piglets	16	7
Growing Pigs	9	5.5
Broiler Chickens	3-10	3-5
Laying Hens	2	1
Veal Calves	7-10	4-5

Adapted from Avcare 2003



1a. How are hormones used in livestock production?

- **Reproductive hormones**
 - Synchronize estrus
 - Induce parturition
 - Used in beef, dairy, pork production
 - **Growth promoting hormones**
 - Beef cattle
 - Mostly implants
 - Growth stimulants slowly released over time
 - Dairy cattle
 - rBST
- Growth promoting hormones are not used in pork and poultry production**

1b. Quantities of hormones used in livestock production?

- **Beef cattle**
 - Estrogenic: estradiol*, zeranol
 - Androgenic: testosterone*, trenbolone acetate
 - Progestins: progesterone*, melengestrol acetate (MGA)
 - >90% of all conventionally raised beef cattle are implanted at least once during their lives
 - **Dairy cattle**
 - rBST
 - ~22% of all dairy cows receive rBST (2000)
 - THIS NUMBER IS DECREASING – growing demand for rBST-free milk
- Supplemented vs. natural**




1c. How they work

- **Growth promoting hormones**
 - Increase feed intake
 - Increase circulating IGF-1 and ST
 - Direct effect on protein accretion
 - Interfere with anti-anabolic effects of corticosteroids

Result:

- Increase feed efficiency
- Increase lean muscle mass




1c. How they work

- **rBST**
 - Changes metabolism of other systems such that more nutrients are available for milk synthesis
 - Increases blood flow/nutrients to the udder
 - Increases uptake of milk precursors by the mammary gland


Result

- Partitioning energy towards milk production increases milk production-no drop in quality



1d. Effects of hormone use

- **Growth promoting hormones (beef)**
 - Depends upon stage of growth
 - Nursing calves: ↑5%
 - Stocker calves: ↑10%
 - Feedlot calves: ↑15%
 - \$5-\$10 return for every \$1 invested



1d. Effects of hormone use

- **rBST (dairy)**
 - **Production cows:**
 - Increases of ~10%
 - Increase 8-12 lbs milk /day (1-1.5 gallons/day)

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Summary

Antibiotics

- Antibiotics are used in livestock production both therapeutically and subtherapeutically
- In-feed antibiotics improve animal health which translates to more rapid and efficient growth
- Antibiotic use has demonstrated economic benefits for livestock producers

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Summary

Hormones

- Six hormones are approved for growth promotion in beef production
- rBST is approved for dairy production but its use is decreasing
- Growth promoting hormones are not used in poultry or pork production
- The use of implants in beef and rBST in dairy dramatically improves growth rates and milk production
- Each is considered among the most cost-effective management practices available to producers

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