



**Growth-enhancing Pharmaceuticals**  
Safe for consumers,  
Safe and beneficial for the environment



*Safe, affordable beef through socially and environmentally responsible practices*

# The safety and benefits of growth-enhancing technologies

“Growth-promoting hormones are a key component of North American beef production. Their use over the past 50-plus years has proven beneficial not only to beef producers, but to consumers and to the environment — all of which benefit from lower costs and more efficient use of scarce natural resources. In short, growth-promoting hormones allow us to achieve the old Yankee maxim of producing more with less,” said Alex Avery.

Alex and Dennis Avery, directors of research at the Hudson Institute’s Center for Global Food Issues, conducted an in-depth assessment of the safety and environmental benefits of growth-promoting hormones. They found that growth promotants in grain-fed beef production:

- Have been found to be safe by scientists all over the world, including the World Health Organization/Food and Agriculture Organization (WHO/FAO)
- Reduce the land required to produce a pound of beef by 67 percent
- Reduce greenhouse gas emissions by 40 percent
- Allow producers to provide more beef using less grain at a lower cost



## Beef from cattle produced with growth-enhancing hormones is safe for consumers

### Method of administration

In beef cattle, growth-promoting hormone implants are administered under the skin of the back of the animal’s ear. The ear is discarded at harvest, ensuring the implant doesn’t enter the food chain.

### Their use is monitored

Regular monitoring by the United States Department of Agriculture (USDA) ensures the implants are used correctly.

### Hormone levels in beef are miniscule

- After extensive and comprehensive research, scientists from all over the world agree there is no measurable difference in natural hormone levels in beef from implanted animals compared to non-implanted animals
- The WHO/FAO Expert Committee has determined the safe acceptable daily intake (ADI) for various growth promoting compounds. Assuming a maximum theoretical residue exposure level, the amount of additional hormone ingested from a whole pound of beef is just 5.25 percent or less of the ADI<sup>1</sup>
  - ADIs are based on the “no-effect” dose in the most sensitive animal tested and then assigned an uncertainty factor ranging from **100- to 1,000-fold less than the no-effect dose** for an extra margin of safety for consumers<sup>1</sup>
- The hormone level in implanted beef is much lower than the amount of hormones produced every day by every man, woman and child

Percentage of ADI* from a pound of beef from an implanted animal	
Growth-promoting hormone	% of ADI for a 150-lb person
Estradiol	1.50%
Progesterone	5.25%
Testosterone	0.03%
Melengestrol acetate	2.30%
Trenbolone acetate	0.57%
Zeranol	0.26%

\*Acceptable daily intake.

— One pound of beef from cattle implanted with estradiol contains **15,000 times less estradiol** than the amount of estrogen produced daily by the average male and **9 million times less** than the amount of estrogen produced by a pregnant female<sup>2</sup>

- The Food and Drug Administration's Center for Veterinary Medicine's (FDA/CVM) testing for carcinogenicity is based on the no-harmful-effect level in the population segment with the lowest normal daily production of a particular hormone. For example, pre-pubertal boys produce the least amount of estradiol and pre-pubertal girls produce the least amount of testosterone, so their daily production levels are used as the baseline to determine product safety<sup>3</sup>

<sup>1</sup> Joint WHO/FAO Expert Committee on Food Additives. 1999. Summary and Conclusions of the Fifty-second meeting.

<sup>2</sup> FDA Veterinarian, Center for Veterinary Medicine, September/October 2002, Vol. XVII, No. V.

<sup>3</sup> 21 Code of Federal Regulations (CFR) 556.240.

## FDA testing proves “no significant environmental impact”

### FDA has determined that natural compounds are of no risk to the environment

Naturally occurring compounds like estradiol, testosterone and progesterone pose no risk to the environment because the amounts used for growth promotion in beef production are much lower than the amounts produced in the environment daily.

### The FDA has established strict approval guidelines for the three synthetic growth enhancing products — melengestrol acetate, trenbolone acetate and zeranol

The environmental impact of synthetically produced growth-enhancing pharmaceuticals is examined as an integral part of the FDA approval process. Third-party researchers conduct extensive tests to prove there is no environmental risk before a product is approved. Tests include:

- Propensity of the product to bioaccumulate in the animal
- Concentrations of the product and/or its metabolites in animal waste
- Degradation rate of the product/metabolites during waste storage
- Degradation rate of the product/metabolites when exposed to sunlight
- Mineralization rate of the product/metabolites in manure or soil
- Tendency of the product/metabolite to attach to soil particles (sorption)
- Safety of the product/metabolites to terrestrial organisms such as soil microorganisms or earthworms
- Safety of the product/metabolite to aquatic organisms
- Likelihood that the product/metabolites will be transferred in field run-off in various kinds of soil

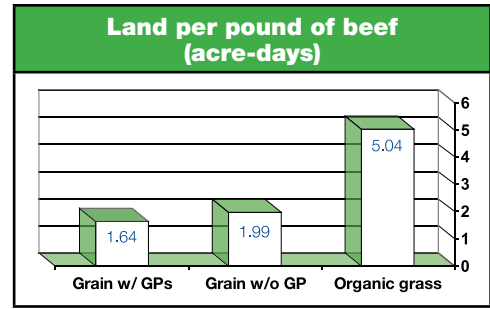


All FDA tests are done using the maximum exposure scenarios to make sure all approved growth-promoting pharmaceuticals are even safer for the environment and for people when used under normal conditions. Once approved, these products are reevaluated by the FDA annually and only remain in the marketplace if they are continually proven safe.



# Growth-enhancing pharmaceuticals improve land-use efficiency and reduce greenhouse gas emissions

An Iowa State University study shows that beef animals finished in a conventional feedlot using grain-based rations and growth-enhancing technologies are three times more land efficient than organic grass-fed beef.



**Land area needed to produce a pound of beef during finishing phase**

*Beef produced in a conventional feedlot using growth-enhancing technologies required 20 percent less land than grain finishing without technology and 300 percent less than organic, grass-finished beef.*

Grain-finishing beef production using growth-promoting technologies is the most efficient use of total farmland resources. This is particularly important as we consider:

- The growing world population
- Increased global per capita demand for beef and other high-quality animal proteins
- A limited land area on which to produce food, feed and fiber (estimated to be 40 percent of the world land area)
- Increased pressure to conserve natural and biodiverse natural habitats

*Conventional grain-based feed programs reduce greenhouse gas emissions (GHGs) by 40 percent compared to grass-only finishing programs. Growth promotants account for 25 percent of this reduction.*

- CO<sub>2</sub> from livestock respiration is not considered a net source of GHGs because the CO<sub>2</sub> itself came from plant matter created through the conversion of CO<sub>2</sub> already in the atmosphere
- Nitrogen fertilizer for grain production used in conventional grain-finishing programs with growth promotants contributes 0.33 lb of CO<sub>2</sub> per pound of beef compared to 0.35 lb for grain-finishing programs without growth promotants
- Methane gas from enteric fermentation and cattle manure contributes 2.21 lb of CO<sub>2</sub> equivalent GHGs per pound of beef produced

Pounds of GHGs per pound of beef produced			
	Grass only	“Natural” feedlot	Conventional feedlot
Respiration	5.77	4.90	4.39
N fertilizer use	0.0	0.35	0.33
Methane from enteric fermentation and manure	5.39	2.69	2.21
Total CO <sub>2</sub> equivalent emissions per pound of beef	11.16	7.94	6.93

Overall, beef production contributes only 2 percent of U.S. greenhouse gas emissions compared to 80 percent from fossil-fuel combustion.



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For a copy of this brochure and/or the companion white paper, *Environmental Safety and Benefits of Pharmaceutical Technologies in Beef Productivity*, go to: [www.SustainableBeef.org](http://www.SustainableBeef.org)