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Science and Logistics Behind Why Chickens Do Not Receive Hormones

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Figure 1: *Photo credit: Tom Tabler*

One of the most confusing topics for consumers today is the question of growth hormone use in relation to commercial poultry production. There is no need for consumers to panic because the chicken at the grocery store is healthy and safe to eat, with no exogenous hormones added, regardless of what the label may say. This remains a commonly misunderstood topic despite the fact that there have been no hormones approved for growth purposes in poultry for decades. Hormone use in poultry has not been allowed in the U.S. since the 1950s (Tabler et al., 2013). In fact, no hormones are approved for growth purposes in dairy cows, veal calves, pigs, or poultry in the U.S. (U.S. Food and Drug Administration (FDA), 2024). Since the 1950s, the FDA has approved a number of steroid hormone drugs for use in beef cattle and sheep, including natural estrogen, progesterone, testosterone, and their synthetic versions, trenbolone acetate (TBA; mimics testosterone), zeranol (mimics estradiol), and melengestrol acetate (MGA; mimics progesterone, used to suppress estrus in heifers).

These hormones are typically formulated as pellets or implants that are placed under the skin on the back side of the animal's ear, except for MGA, which is administered as a feed additive. The implants slowly dissolve over time and do not require removal. The ears of treated animals are discarded at slaughter and are not used for human food. The FDA establishes acceptable safe limits for hormones in meat. A safe level for human consumption is a level of drug in the meat that would be expected to have no harmful effects in humans based on extensive scientific study and review.

Confusion remains

The hormone question has been a concern for the poultry industry for decades. The high level of misunderstanding from consumers is highlighted by the fact that questions often start with "Why" instead of "Does". Questions most often asked are "Why does the poultry industry feed hormones to make chickens grow so big and fast?", not "Does the poultry industry feed hormones?" In recent years, spread largely by social media and so-called "food experts", the myth that chickens are fed hormones to produce more meat has rapidly spread globally (Esquivel-Hernandez et al., 2016). This inaccurate information has not only negatively affected the poultry industry, but also created health concerns among consumers.

Much of the confusion over hormone use in poultry likely comes from the fact that hormone use is allowed by law and quite common in beef cattle intended for slaughter to promote growth by complementing the effects of naturally occurring hormones in the cattle. The boost in growth rate created by hormone implants allows for cattle to be finished earlier, thereby requiring less time on feed and fewer resources per pound of meat produced which improves efficiency and helps reduce beef prices for consumers at the grocery store.

As a result, growth hormones, natural or synthetic versions of somatotropin, estrogen, progesterone, and testosterone are used in cattle and sheep to increase growth rate and meat production efficiency, thereby controlling prices at the meat counter (Rumsey et al., 1992; Johnson and Chung, 2007; Stephany, 2010). World-wide health organizations have established a list of approved products, withdrawal periods, and safe limits for use of these hormones in livestock to ensure that there are no health impacts associated with meat consumption (Stephany, 2010). Since beef cattle receive hormones, consumers assume that chickens do as well; however, these growth hormone implants are not approved for use in poultry meat production (Esquivel-Hernandez et al., 2016).

Hormones are naturally occurring chemical messages released into the blood stream by the hormone-producing organs in the bodies of all animals, including humans. This means that humans, beef cattle, chickens, and other animals have naturally-occurring hormones in their systems at all times. Hormone residues in meat are an increasing concern among consumers in Europe and the U.S. (Sundlof and Cooper, 1996). This is, in part, because synthetic steroid hormones used as pharmaceutical drugs have been found to affect cancer rates. For example, a synthetic estrogen drug used in the 1960s, diethylstilbestrol (DES), was withdrawn from use after it was found to increase the risk of vaginal cancer in daughters of treated women (Ghandhi and Snedeker, 2000). In addition, the FDA banned oral DES use in cattle production in 1972 and DES implant use in cattle in 1973. The ban was overturned by a U.S. Court of Appeals in 1974 on grounds that the FDA failed to hold proper hearings. After FDA hearings on DES use in 1977, the FDA banned all use of DES in cattle production in 1979 (Raun and Preston, 2002), leading to the development of a number of other growth stimulation products for cattle.

Further confusion comes from the fact that steroid hormones can also come from plants. For years, it was believed that hormone exposure came only from food of animal origin. We now know that numerous plants that are important to human nutrition contain phytoestrogens. Phytoestrogens are a broad group of plant-derived compounds of nonsteroidal structure that can behave as estrogen mimics (Setchell, 1998). Numerous foods of plant origin contain hormonally active substances at concentrations exceeding those found in meat. Table 1 depicts the estrogenic activity of several common foods.

Table 1. Estrogenic activity of common foods (ng/500g)

Food	Estrogenic Activity
Soy flour defatted	755,000,000
Tofu	113,500,000
Pinto beans	900,000
White bread	300,000
Peanuts	100,000
Eggs	555
Butter	310
Milk	32
Beef from implanted steer	7
Beef from non-implanted steer	5

Sources: Hoffman and Eversol (1986), Hartman et al. (1998), Shore and Shemesh (2003), (USDA-ARS (2007), Treffer (2013). Units are in nanograms of estrone and estradiol for animal products and isoflavones for plant products per 500 grams of food (17.6 oz).

In addition, the hormone issue is made more difficult to understand because a human's natural steroid production far exceeds the daily hormonal intake values from either plant or animal foods. Table 2 lists daily human hormone production and amounts found in birth control pills.

Table 2. Daily natural estrogen production by humans and amounts found in birth control pills.

Item	Estrogen Amount
Pregnant woman	19,600,000 ng/day
Non-pregnant woman	513,000 ng/day
Adult man	136,000 ng/day
Pre-puberal children	41,000-54,000 ng/day
High-dose birth control pill	50,000 ng
Regular-dose birth control pill	30,000-35,000 ng
Low-dose birth control pill	20,000 ng

Sources: Hoffman and Eversol (1986); Tabler et al. (2013).

Why chickens aren't fed hormones

Hormone growth **implants** have been mentioned several times but what about **feeding** growth hormones to animals? There is a reason that growth hormones are not fed to chickens. Regardless of what you may have read, been told, or believe, feeding growth hormones to chickens would not be effective. Hormones exist in two different chemical forms; steroids and proteins. *Steroid* hormones remain active in the body when taken orally. For example, birth control pills are steroid hormones that can be taken orally and remain effective after passing through the digestive tract. However, *protein* hormones are broken down in the stomach and are extensively metabolized after leaving the gut, thereby losing their effectiveness on the body when ingested. To have an effect on the body, *protein* hormones must be injected, not consumed. The implant ensures that each animal gets a specific daily dose based on the slow-dissolve release. Since the consumption of dry matter is variable among both beef cattle and sheep, the implant guarantees a constant level of hormone and efficient delivery.

Growth hormones are proteins, similar to insulin that is used to treat diabetes. Currently, no oral form of insulin exists to avoid insulin injections. Insulin taken orally would be broken down in the digestive tract as other proteins are broken down, and would be ineffective. Protein growth hormones given to chickens via the feed or water would be broken down in the digestive tract and rendered useless. Therefore, like insulin in humans, if growth hormones were allowed to be given to chickens (which in the U.S. and many other countries, they are not), they would have to be injected to be effective. Additionally, to be administered successfully, chickens would need to receive growth hormone injections multiple times each day throughout the growing period, creating unmanagable labor and logistics issues (Czarick and Fairchild, 2012).

Most broiler houses have 20,000-40,000 birds per house and there are multiple houses on each broiler farm. That would be hundreds of thousands of birds that would need to be caught and injected multiple times each day for growth hormone to be effective. There were approximately 32,000 broiler farms in the U.S. in 2022 (USDA, 2024), making this a logistically impossible task, nor does it need to be done. Modern broilers have been genetically selected by primary breeders to grow to their physiological limit without growth hormones. Using growth hormones would force chickens to grow too rapidly, resulting in increased health and welfare concerns and higher mortality rates.

Science behind why today's chickens grow fast

In recent decades, global beef production has doubled, whereas chicken meat production has increased approximately ten-fold (Thornton, 2010). The successful improvement of poultry meat production has nothing to do with growth hormones. It is the result of science and combined progress in the fields of genetics, nutrition, microbiology, immunology, management, engineering, and food processing (Esquivel-Hernandez et al., 2016). Three of these fields take most of the credit for why today's chickens grow at a rapid rate.

First is the phenomenal success of primary breeder companies in selecting the best birds for growth and performance. For the past several decades, poultry geneticists have been able to reduce by roughly one day per year the time it takes for birds to reach a specified target weight. Poultry geneticists benefit from the short generation interval of chickens compared to other food animals, allowing them to make huge genetic improvements in a short period of time. Genetic improvement in the beef and pork industries comes much slower because of the increased generational interval and the longer time it takes to recognize genetic potential and variation and select for improvement (Tabler et al., 2013).

For example, broiler breeder chickens can produce offspring within approximately 6-8 months, meaning that several generations of chickens can be produced in the time required for a single generation of beef cattle. Beef cattle typically require 2-3 years to reach reproductive maturity and produce the next generation. As a result, poultry breeding and genetics programs can evaluate and select superior birds much more frequently than cattle breeding programs. Over a decade, poultry breeders may evaluate 15-20 generations of birds, whereas cattle breeders may only see 3-5 generations during the same time period. This rapid turnover in the poultry industry allows geneticists to identify and propagate superior and desirable traits such as improved feed efficiency, growth rate, and meat yield far more quickly in poultry than in other livestock food animal species.

Second is years of scientific research related to nutritional requirements of the bird. We know exactly what we should be feeding based on different genetic strains and what sector the bird is used for (meat production, hatching egg production, table eggs). Unique feed formulations exist for each type of bird we are feeding. Meat birds today are kept to various market weights based on customer needs and specific feed formulations are created for each target weight based on energy, protein, vitamins, minerals, etc. to optimize performance, welfare, and growth. Even though the beef industry understands cattle nutritional requirements, it is not to the level of the poultry industry, especially when it comes to specialized sectors. In addition, the poultry industry has largely removed outside environment as a factor by moving production inside. Environment plays a major role in cattle nutrition, since production is mainly outside, and heavily dependent on forages, which are heavily dependent on temperature, rainfall, and environment.

Finally, we better understand the necessary management practices and the kind of environment the bird needs to take advantage of its genetic and nutritional potential. This includes providing the proper temperature, air quality, ventilation, lighting, and feeder and drinker space at every age to obtain optimum performance. Sound management practices that maintain the correct environment, along with high-quality feed and world-class genetics, are the winning combination that yields a superior broiler chicken that does not need and would not benefit from added growth hormones.

Summary

The use of growth hormones in chickens is logistically impossible, and not legally approved. In addition, the use of growth hormones in poultry production is unrealistic because 1) these compounds simply do not produce growth promotion effects in young chickens, 2) they are too expensive to use (even if they worked in chickens), 3) their use is illegal in chickens in the U.S. and many other countries, and 4) they simply are not needed in the poultry industry. The truth is that no exogenous hormones are used in poultry production. Lastly, the poultry industry must do a better job of emphasizing this fact to consumers to combat the confusion, myths, and inaccurate information that is prevalent regarding hormone use and chicken production instead of using misleading labels that creates more confusion and misinformation for consumers.

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