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ESSAY

Adverse impact of industrial animal agriculture on the health and welfare of farmed animals

Joyce D'SILVA

Compassion in World Farming, Petersfield, Hampshire, UK

Abstract

Industrial animal agriculture is grounded in the concept of maximizing productivity and profit. Selective breeding for maximum productivity in one characteristic of the animal (e.g. milk yield in cows, or breast meat in broiler chickens) has resulted in genotypes and phenotypes that may predispose the animals to poor health and welfare. The conditions in which these individuals are kept may also frustrate many inherited behaviors that they are strongly motivated to perform. In order to curb the resulting harmful aberrant behaviors, such as feather-pecking in chickens, we sometimes resort to mutilating the animals. In many places chickens are routinely de-beaked by means of a hot metal guillotine. Compassion in World Farming (an international organization that promotes the humane treatment of farm animals) believes that it is unethical to treat sentient beings in such ways. We have a duty to respect farm animals' sentience by providing them with housing conditions that take their needs and wants into account, and by reverting to the use of dual-purpose, slower-growing breeds that have the potential for good welfare. Alternatives to current farming practices are available, and we owe it to the animals, and to our consciences, to pursue them.

Key words: animal welfare,intensive animal husbandry, selective breeding, stereotypic behavior.

INTRODUCTION

Industrial animal agriculture, which is also known as factory farming or intensive livestock production, is grounded in the concept of maximizing productivity and, therefore, profit. Perhaps its most apt description is the term "CAFO," a term that is in widespread use in North America, which means "confined animal feeding operation" The term CAFO would win no prizes in a public relations contest, but as a true statement of the underlying values of factory farming, it is wonderfully clear. The animals are confined, they are fed and, of course, they are seen purely as units of production and potential profit.

Correspondence: Joyce D'Silva, Compassion in World Farming, Charles House, 5a Charles Street, Petersfield, Hampshire GU32 3EH, UK. Email: joyce@ciwf.co.uk

Maximizing productivity has been the driving force in the increasingly intensive nature of the farming of animals, and has resulted in serious threats to the health and welfare of the animals involved.

SELECTIVE BREEDING

Selective breeding of farm animals has been practiced for centuries, but new technology has significantly accelerated this process over the last 40 years. Farm animals are normally selected for fast growth and high yield. Increased growth rates and muscular development or higher yields of milk or eggs can put enormous strain on both the skeletal and cardiovascular systems of animals.

Broiler (meat) chickens

Breeding stock for the 45 billion broiler chickens slaughtered globally per annum come from just three companies.

One of these companies is called Cobb-Vantress. The "Cobb 500" chicken, a popular breed, increases in bodyweight by 45-50 g per day, thus reaching market weight 1 day earlier each year (Cruickshank 2003). Data from broiler breeding companies' management manuals show that the time taken for a broiler chicken to reach a weight of 2 kg declined from 57 to 37 days between 1972 and 1999, and that bodyweight gain per day has increased from 34 to 53 g, which represents a 54% increase. Savory (2002) concludes his survey of these data by stating that "some of this change reflects improved nutrition and management but most is due to genetic selection."

The impact of fast growth can be seen most clearly in the prevalence of lameness in broiler chicken flocks. Kestin *et al*. (1992) found that 90% of broilers had abnormalities in their gaits with varying degrees of severity. Subsequent studies have confirmed similar problems of lameness (Sanotra *et al*. 2003). Many of the birds are lame because they have skeletal abnormalities primarily caused by rapid growth, which means that they become too heavy for their legs. Some also develop diseased joints. Kestin *et al*. (2001) concluded a large survey of broiler chickens in Denmark and Sweden with the comment that their results "support the hypothesis that the lameness which develops in modern genotypes of broilers is a result of their selection for high live weights and rapid growth rates, resulting in abnormally high loads being placed on relatively immature bones and joints."

The European Commission Scientific Committee on Animal Health and Animal Welfare (2000) noted that "it is clear that the major welfare problems in broilers are those which can be regarded as side effects of the intense selection mainly for growth and feed conversion. These include leg disorders, ascites, sudden death syndrome in growing birds and the welfare problems in breeding birds, such as severe food restriction." They concluded by stating that "most of the welfare issues that relate specifically to commercial broiler production are a direct consequence of genetic selection for faster and more efficient production of chicken meat."

Corr *et al*. (2003) pointed out that, along with the rapid growth rate, the modern broiler has been selected to produce more breast muscle, thus resulting in a change of conformation. Both of these factors, the authors state, can affect locomotion: the rapidly increasing bodyweight will place greater demands on the immature skeleton, and the change in shape can alter the forces produced during walking. It appears that the rapid growth of breast muscle moves the centre of gravity forward. Essential behavior patterns, such as feeding, drinking, walking, scratching, pecking and dust bathing are reduced in birds with leg disorders, and the birds spend more time lying down, resting and sleeping (Vestergaard & Sanotra 1999; Weeks *et al*. 2000). This means that they are lying on the litter floor of the broiler shed, which probably houses approximately 20 000 chickens. Over the 6-week rearing period, this floor becomes increasingly filthy with excreta and the build-up of ammonia. Burns to the hocks and blisters on the feet are a frequent result.

Even though broiler chickens are sent for slaughter at 6 weeks of age or younger, approximately 1-2% may develop heart problems and ascites before this. Genetic factors are one of the causes of the increased strain placed on the cardiovascular system due to fast growth (Maxwell 1995; Julian 2000).

"Modern" breeds of dairy cows

The effects of selective breeding can also be seen in the modern dairy herd. The average dairy cow now produces more than 6695 L of milk per year (Milk Development Council 2006), approximately 20% more than her counterpart from just 10 years ago. This is approximately 20 times more milk than her calf needs. The calves born to dairy cows are removed from their mothers within 2 days, and the cows are milked to capacity in order to satisfy the demands of human consumption. Although this increased yield is not entirely due to breeding, it is undoubtedly true that the shape of the dairy cow has changed. Breeding larger and longer Holstein cows has meant that many dairy "cubicle" sheds are now inadequate as, when the cows stand in their cubicles, their hind feet have to rest on the slurry-covered floor behind the cubicle rather than in the cubicle itself. According to veterinary surgeon Ian Baker of the Farm Animal Welfare Council (an advisory body to the UK government) most surveys show the incidence of lameness in western dairy herds to be approximately 50%, with a prevalence of approximately 20% (Robertson 2006). The actual shape of the cow has also been altered to give an ever-larger udder so that she can produce more milk. This is also one of the contributory factors to increasingly high levels of mastitis, a painful udder inflammation. At any given time, half of all US dairy cattle have mastitis (Adcock & Finelli 1995).

Beef cattle

One extreme example of selective breeding for excessive muscle is the "Belgian Blue" breed of cattle. Breeders latched on to a "natural" mutation in a gene that produced "double-muscled" animals. Now these mighty creatures, with their very large hindquarters, are highly prized, because large quantities of meat can be taken off a single animal. The downside is that the pelvic region in the females does not sufficiently expand when giving birth to double-muscled calves, so most births are performed by cesarean section (European Commission Scientific Committee on Animal Health and Animal Welfare 2001).

CONFINEMENT

All animals on factory farms are confined in some way. An example of individual confinement includes the keeping of calves for veal production in individual crates from the age of 1 week to slaughter at the age of 4-6 months. As such, the calves are unable, for most of the rearing period, to turn around, and are only able to stand up, lie down and take a couple of steps forwards or backwards. In natural systems, calves live in social groups and suckle from their mothers between three and eight times per 24-h cycle (Hall 2002). In the veal crate, they are isolated, can usually see only the calf crated opposite to them and have no regular physical contact with any other being. They are only fed their low-iron reconstituted milk powder once or twice a day. Thus, their suckling instinct is frustrated and sometimes, at the end of feeding time, they can be seen stretching their necks out to suck the calf in the next door crate, the only time in the 24-h period that they are able to make contact with each other. The low-iron liquid diet is fed so that the flesh produced will be the "white veal" that is most favored by gourmet restaurants. This means that the calf may be constantly on the verge of clinical anemia. In 1996, the European Union (EU) decided to ban keeping calves in crates in which they could not turn around (to take effect by 2007), and they also insisted that both iron and roughage should be added to the diet. However, in North America, the system continues unchanged. When finally taken to slaughter, calves are often seen to stagger towards the truck, as they have never previously used their legs for walking (J. D'Silva, personal observation).

Pregnant sows are also commonly kept in single stalls, known in Europe as sow stalls and in North America as gestation crates. The sow is housed individually and is either chained to the floor or to the side of her crate. Alternatively, there are bars at the front and two sides of the crate and there is a chain across the back of the sow that can be removed when she is taken away. The sow spends most of her 16.5-week pregnancy in the individual stall, and is unable to turn round throughout that time. She lies on a concrete and slatted floor with no straw or other bedding material for comfort. As pigs, too, have been bred to grow heavier and meatier, the sows often develop leg sores as they lie on the wet concrete.

The pig's snout is highly sensitive and well innervated (Jensen 2002). In light woodland, which is the natural environment for pigs, the animals spend up to 50% of their time using their snouts to root in the soil, seeking tubers and grubs to eat, and spend another 23% in foraging behavior (Stolba & Wood-Gush 1989). Such behavior is made impossible within the confines of a concrete and metal-barred crate.

The sow's individual confinement continues when she is ready to farrow (give birth). She is put into another crate with additional space for her piglets. Only some sows receive a little sawdust or woodchips on which to lie. The acute instinct to build a 1-m-high nest in which to farrow is frustrated, and sows are often observed making down-forward-and-upwards movements at the front of the farrowing crate in an attempt to build a nest from nothing, and touching only the metal bars at the front of the crate. Maternal instincts are frustrated as well, as a sow can only just see her piglets but, because she cannot turn round, she can barely touch them with her snout. In addition, piglets are only allowed to suckle for 3-4 weeks before they are taken away for fattening. Under natural conditions they would suckle for an average of 17 weeks (Jensen 1988).

OVERCROWDING

Broiler (meat) chickens

Many animals are crowded together to maximize profit. The broiler chicken is an obvious example. Day-old chicks are placed, perhaps 20 000 at a time, into large, often windowless, sheds. The floor is composed of wood shavings known as litter. Feeding, watering, ventilation and temperature are controlled. At first, there is plenty of room for the chicks to move round, but as they get near slaughter weight, their space allowance drops so that there are often 17-20 chickens per m^2 of floor space. By this time, the floor appears to be carpeted with chickens. Birds struggling to get to the food and watering points are frequently observed. This struggle is made more difficult by the aforementioned high incidence of lameness, and there is a fairly high casualty rate among broilers. One of the main jobs of the broiler stockman is to walk through the sheds daily, removing the dead chickens and culling the dying ones.

In these sheds, the birds' natural behaviors, such as perching, walking, running and flying, are obviously frustrated.

Egg-laying hens

The other type of chicken widely used in farming is the egg-laying hen, and these are kept in battery cages with four or more other birds. The Scientific Veterinary Committee of the European Commission (1996) declared that "it is clear that because of its small size and barrenness, the battery cage as used at present has inherent severe disadvantages for the welfare of hens." The average space used by hens to perform basic behaviors such as standing, ground-scratching, turning, wing-stretching, wing-flapping, feather-ruffling and preening varies between 475 cm^2 and 1876 cm^2, ranging up to 2606 cm^2 (Dawkins & Hardie 1989). Under current EU rules each caged hen has 550 cm^2 available; in the US, it is considerably less.

Because caged hens stand on a sloping wire mesh floor, they are unable to indulge their instincts for dust-bathing or the normal near-constant pecking at the ground for food. They therefore tend to turn on each other and peck out each other's feathers. To prevent the severe damage that occurs due to feather pecking, birds often have the front one-third of their beak cut off when they are a couple of days old. Since the tip of the beak is well supplied with blood vessels and nerve endings, cutting it off with a hot metal guillotine has been shown to cause both immediate and enduring pain (Duncan *et al*. 1989).

Gregory and Wilkins (1989) found that up to 30% of battery hens suffer broken bones when being removed from their cages at the end of lay and during transportation to the slaughterhouse. Approximately 35% of all mortalities among caged hens in a commercial-scale study were attributable to bone fragility, known as cage layer osteoporosis (McCoy *et al*. 1996). The lack of exercise, combined with the constant demands for calcium for egg production, undoubtedly cause bone fragility and susceptibility to breaks.

Hens have a strong preference for laying their eggs in a nest and are highly motivated to perform nesting behavior (Scientific Veterinary Committee of the European Commission 1996). When deprived of a suitable nest site, they display abnormal behaviors indicative of frustration, such as increased pacing and vacuum nesting (Mills & Wood-Gush 1985). Appleby *et al*. (1992) consider frustration of nesting to be the most severe behavioral problem of hens in battery cages.

Battery cages are not provided with nests, nor do they allow natural behaviors such as dust bathing. Hens are highly motivated to perform dust-bathing (Lindberg & Nicol 1997) and have a strong preference for a littered floor on which to carry out the behavior (Scientific Veterinary Committee of the European Commission 1996). Without access to litter, hens develop sham dust-bathing behavior (van Liere 1992); this involves stereotypic attempts to dust bathe on the wire floor of their cage.

Fattening pigs

Pigs being farmed for meat are often kept in very crowded pens with concrete floors that slope towards a slatted drainage area. Bedding material is rarely supplied. Again, these highly inquisitive rooting animals are frustrated and often proceed to bite each other's tails, which can cause inflammation. If the wounds are left untreated, infection can set in and travel up the spine and/or to the lungs, causing abscesses (van den Berg 1982). To prevent this, pigs are often tail-docked in infancy; in addition, their canines and incisors are often also cut or ground down (Jensen 2002). The animal is once again mutilated physically in order to fit into a system of deprivation and frustration of natural behavior. When a more stimulating environment is provided, with bedding material and additional "toys," or when the pigs are kept in outdoor free-range situations, the tendency to tail-bite evaporates.

GENETIC ENGINEERING AND CLONING

Cloning is based on the simple premise that best is best. In other words, a cell from the "best" animal is harvested and cloned in order to produce many replicas. Along the way, the cloned embryo is inserted, via cervical interference or surgery, into a surrogate mother. There is a great amount of interference that occurs with both with the females who produce the eggs and those used as surrogates. Cloned animals have a tendency to grow too big in the borrowed uterus, so caesareans are often required. Mortality rates are high: according to Renard *et al*. (1999) 40-74% of cloned animals died just before or after birth. Recent research suggests that clones may be born with crippled immune systems. This finding could explain why clones often die from infections soon after birth (Carroll *et al*. 2005).

Genetic engineering too has a poor success rate, as animals are often born with multiple defects, for example the first genetically engineered pigs, the Beltsville pigs, whose extra human or cattle growth hormone genes made them unable to stand up or mate (Pursel *et al*. 1989). The situation has not improved much since then.

SUMMARY OF THE ADVERSE IMPACTS OF INDUSTRIAL ANIMAL AGRICULTURE

We can see that the ethos of intensive, industrial animal farming has failed to take account of the welfare of the animals themselves. Selective breeding has resulted in the use of genotypes or phenotypes that may have a short burst of productivity or high yield, but are unsustainable for the animals' own health and welfare. Two obvious examples are chickens with painful legs and cows with unwieldy bodies and high rates of lameness and mastitis.

The result of confinement and overcrowding is a lack of exercise and natural locomotory behavior for the animals. This, in turn, weakens both their bones and muscles. These environments are so far removed from the animals' "natural" habitat, that not only is movement restricted, but psychological and social well-being are adversely affected. Sometimes, in order to curb the effects of the resulting aberrant behaviors, the animals are mutilated by a variety of techniques.

Industrial animal farming frustrates strong inherited behaviors, such as maternal behaviors. It denies young animals the opportunity for exploratory "play" behavior. It either keeps animals in isolation, away from their peers, or in such close proximity to them that the animals are unable to establish normal group sizes.

As our appreciation for the mental and emotional capacities of farm animals develops, and as their intelligence and sentience are realized, such farming systems are not only seen as old-fashioned and out-dated, but inherently cruel. Compassion in World Farming believes that there is a better way forward.

COMPASSION, HEALTH AND A BETTER ENVIRONMENT: A POSITIVE WAY FORWARD FOR FARMING

Compassion in World Farming believes that farm animals' intelligence, family relationships and sentience should be respected in farming systems. Selective breeding for faster growth and higher yield should be abandoned in favor of breeding and rearing dual-purpose, more traditional breeds. Healthier animals will result in a decrease of the overwhelming use of antibiotics in intensive agriculture and will reduce the risk of the development of human antibiotic-resistant bacterial infections. Allowing the animals free movement and access to adequate space will encourage healthy bone and muscular development and reduce the likelihood of antisocial and stereotypic behaviors. Free movement will promote behaviors, such as mothering or exploratory play, which have positive effects on the health and well-being of farm animals.

Keeping animals in better environments will be better for the environment itself too. The gallons of liquid slurry that pour from intensive dairy and pig farms can be replaced by more healthy manure, or if the animals are free-ranging, the manure can serve to fertilize fields naturally. Therefore, less artificial fertilizers would be required and water pollution and air pollution caused by intensive units could be dramatically reduced.

Most importantly, Compassion in World Farming sees free-range and organic farming systems as the means to providing animals with the more natural lives that they surely deserve. If they are to end up on our plates and in our stomachs, then we owe them a life worth living.

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