Future-proofing the bottom line: The food business case for animal welfare and protein diversification in sustainability efforts

Introduction

With an increasing number of U.S. food businesses committing to purchase eggs, chicken, and other animal products from higher welfare production systems, animal industries have voiced concerns about the impacts of these commitments on specific aspects of sustainability, such as environmental impact, food security, and cost. While these concerns are not without merit, animal welfare is also a growing social concern among consumers, and as such, a strong definition of sustainability should address animal welfare, with a view toward carefully balancing the needs of humans, animals, and the environment.

Background

Sustainability is a complex issue not only because of its multidimensionality, but because of the differing, and often conflicting views of stakeholders (Tucker, 2013). For example, raising broiler chickens in stacked cages may seem sustainable from a producer perspective, since the required inputs (land, energy) are often lower, but from the perspectives of the community, consumers, and the animals themselves, these systems are less sustainable in the long term. Businesses looking to future-proof their systems and portfolios must take all of these perspectives into account when deciding how they will produce or source their protein moving forward. Additionally, there are many competing definitions of sustainability, and determining whether or not a practice is sustainable largely depends on how we define the term. The tendency to choose definitions that favor particular views on the practices, processes, or products in question can be a problem, and multiple definitions and viewpoints must be considered in order to make a balanced assessment.

Sustainability can be defined based on the efficiency of a system with regard to the inputs required to produce certain outputs or outcomes. For example, in the United States, the efficiency of broiler chicken production has greatly increased over the past 50 years—that is, if we consider only inputs and outputs. In 1950, it took three pounds of feed to produce one pound of broiler chicken, live weight. In 2016, the amount of feed per pound had decreased to 1.87[1]. However, with increased feed efficiency and faster growth rates have come a myriad of health and welfare problems for broiler chickens, and there is growing social concern in response. According to a 2017 consumer survey conducted on behalf of the National Chicken Council (NCC), 43% of consumers report being “extremely or very concerned” about the way chickens

[1] National Chicken Council, 2017.
http://www.nationalchickencouncil.org/about-the-industry/statistics/u-s-broiler-performance/

are bred to optimize meat production[2]. Even within the limits of the efficiency framework, a system is said to be sustainable if it simultaneously achieves good outcomes for society, the environment, and the economy (Tucker, 2013). In this sense, the large scale, vertically-integrated production of broiler chickens in the United States is not a sustainable model.

A strong definition of sustainability should tell us not only if a system is efficient, but also how capable it is of adapting to changing circumstances and remaining viable over time. A term often used to describe this is resilience. In simple terms, resilience is the ability of a system to cope with disturbances such as environmental factors, market forces, and social change. Resilient systems have the following characteristics:

- Adaptive: systems have the ability to reorganize, adopt novel solutions, and learn from experience—for instance, in response to changing consumer demands (Marshall, 2010).
- Robust: systems are designed to resist internal and external sources of failure—for example, over-dependence on external inputs such as grains (Thompson, 2016).
- Regenerative: systems are able to self-generate and regenerate some of the resources they need, thus lessening their dependence on external resources.

U.S. beef production systems provide a good example of the differences between efficiency-based sustainability and resilience. A comparison of three systems for beef cattle production in the U.S. (feedlot, grass-fed, and rotational grazing) found that while feedlot production may seem more efficient in terms of production, it is not sustainable in that it lacks the potential to self-sustain over extended periods (e.g., it needs large amounts of external inputs like water, grains, and antibiotics), and it does not result in regeneration of valuable resources like soil (Norell, 2017). Practices like rotational grazing not only produce significantly lower amounts of greenhouse gas (GHG) emissions, but can actually have multiple benefits for sustainability across several dimensions, such as reduced soil erosion, reduced agricultural runoff, improved wildlife habitat, and better worker health (Norell, 2017).

Industry Concerns

1. Environmental concerns

Industry opinions on the impacts of higher welfare production on sustainability have pointed out that measures to improve welfare can have negative environmental impacts because they require greater amounts of inputs. For example, as of September 2017, 53 U.S. food businesses have made public commitments to source chicken from suppliers that produce to higher welfare standards, including the use of breeds with higher welfare outcomes. Breeds that

[2] US Chicken Consumption Survey, ORC International. Presented at the 2017 Chicken Marketing Summit, Asheville, North Carolina.
http://www.wattagnet.com/articles/31412-infographic-chicken-consumers-top-concerns

meet this criteria have historically been slower growing. In light of this, the National Chicken Council (NCC) released an analysis in 2015, which claims that switching to slower-growing breeds in broiler production would require more resources; for example, 255,000 additional gallons of water, per broiler house, per year, in addition to increased amounts of land and feed (NCC, 2015). This type of analysis is an example of a view of sustainability limited to efficiency concerns; while it considers the quantity of resources used, it does not account for the effects on quality of these resources (for example, soil fertility and water quality in the long term), nor does it factor in consumer sentiment.

2. Food security concerns

One of the primary arguments used by the industry to validate the continued use of conventional factory farming practices is that the current system is the only viable way to produce enough food to meet current and future demands. A proposal that attempts to balance these food security concerns with sustainability issues is sustainable intensification. Sustainable intensification seeks to increase output or yields, while keeping the environmental footprint as small as possible (Rockström et al, 2017). Some of the main premises of sustainable intensification are: 1) an increase in food production is necessary in order to achieve global food security; 2) we need to increase yields without significantly increasing land use; 3) increased production and improved environmental outcomes are of equal importance; and 4) technologies and agricultural techniques used to achieve sustainable intensification should be chosen based on scientific evidence (Garnett et al, 2013).

While sustainable intensification may be an approach that addresses food security, its utility and adequacy depend strongly on context. For example, in regions where land and other resources are scarce—and crop yields have been historically below average—this approach has been used to advance food security goals. However, food security involves not only producing sufficient amounts of food, but also food that supports a nutritionally-adequate diet, which is not guaranteed by an increase in yields. Where intensification is clearly not a viable path to sustainability, such as animal production, it is often necessary to invest in better production systems that can result in better welfare as well as acceptable environmental outcomes. These investments can include increased amounts of inputs, and this can be perceived as both having economic and environmental trade-offs.

3. Economic concerns

Perhaps the most pressing industry concern regarding the adoption of higher welfare standards relates to the cost of implementing the necessary changes to infrastructure, practices, and processes, as well as higher costs of production in general. Furthermore, producers worry that, though demand for higher welfare products is growing, consumers will be unwilling to cover part of the cost of higher welfare production by paying more for these products. Both of these are reasonable concerns. An analysis of 23 consumer willingness-to-pay (WTP) studies found that consumers' WTP for products labeled for higher welfare is about 15 percent above base price (Cicia and Colantuoni, 2010). However, there may be a gap between citizen interest in animal welfare and willingness to act on that interest by seeking out and purchasing higher welfare

products. Typically, reported level of concern for animal welfare issues is higher than consumers' WTP or reported purchases of higher welfare products (Grethe, 2017). This is not attributed to market failure, but rather to consumers' tendency to only consider a limited range of scientific evidence when making changes to production practices. For example, in Europe, many egg producers transitioned from battery to enriched colony cage production systems. This shift largely dismissed the public's perspective on what changes matter to them (Grethe, 2017). Herein lies an opportunity for food companies to more carefully consider consumer demands, as well as communicate more effectively about changes being made and the rationale behind them. From an economic perspective, considering societal views in the design, implementation, and public communication of animal welfare improvements is key to resolving the discrepancies between consumer concern and WTP (Grethe, 2017). What is also clear to economists is that animal welfare will remain a priority concern for consumers, which is likely to result in a sustained demand for higher welfare products in the context of sustainability (Grethe, 2017).

Why factory farming is not sustainable

Whether we attempt to define and measure sustainability based on efficiency, resource sufficiency, or resilience, there will always be disagreement about what variables to measure and how to measure them. Furthermore, the issue's inherent complexity ensures that even the most detailed assessments are unable to model all of the possible scenarios in order to determine how sustainable a practice will be in the future. However, what is clear is that continuing to follow the factory farming model is not sustainable, and cannot be justified by environmental, food security, or economic concerns.

1. Environmental considerations

Factory farming has already proven to be a significant and consistently-growing burden on the environment. Although animal industries have focused for many years on improving production efficiencies, factory farming remains unsustainable from resource and efficiency perspectives: more than 43% of the world's total harvest of human-edible crops are fed to farm animals, only to be inefficiently converted to animal protein for human consumption (20 lb of feed per lb of beef, 7.3 lb of feed per lb of pork, and 4.5 lb of feed per lb of chicken) (HM Treasury and Cabinet Office, 2008; Pimentel et al, 2008)[3]. In other terms, it takes 100 calories of grain to produce between 17 and 30 calories of meat, milk, or eggs, which means that up to 83% of consumable calories are lost in the process of conversion to animal protein (Stevenson, 2015).

The environmental impacts of factory farming are also well documented. According to the 2006 FAO report entitled "Livestock's Long Shadow," livestock production accounts for 9% of all CO_2 derived from human-related activities, 65% of human-related nitrous oxide, 37% of all human-induced methane (a compound 23 times as warming as CO_2), and 64% of ammonia, which contributes significantly to the production of acid rain. Additionally, livestock production

[3] These figures are based on dry feed to live weight conversion, and therefore do not adequately represent, pound for pound, the ratio of dry feed to equivalent dry weight of animal protein.

contributes to biodiversity loss and plays a key role in the chain of production that results in vast amounts of agricultural runoff, which is considered the main cause of eutrophication and oceanic “dead zones” (Lymbery, 2017) .

2. Socio-economic considerations

Factory farming creates vulnerabilities in terms of social and economic risks. While factory farming and large-scale monocultures have historically been portrayed as a solution to world hunger, food security may actually be jeopardized by the tendency to focus on increasing yields of a few staple crops, rather than on producing a diversity of food for nutritionally-sound diets (Godfray and Garnett, 2014). In areas of agriculture where intensification has already pushed the limits of what is sustainable in a broad sense, continuing to build on the factory farming model through strategies like sustainable intensification poses a notable risk in terms of economic and social viability.

From an economic perspective, in industrialized countries, animal production is already so intensified that a move in the same direction is likely to result in only marginal gains in yields, and in poorer welfare (Godfray and Garnett, 2014). In fact, animal welfare research has found that moving away from intensive practices in favor of production models that result in better animal health and welfare may actually improve production outcomes (Godfray and Garnett, 2014). For example, better welfare can often result in a reduction of losses, and even gains in terms of productivity and profitability; for example, it is estimated that heat stress, a condition often correlated to high stocking densities, costs the U.S. livestock and poultry industries $1.7 - 2.4 billion per year (Place and Mitloehner, 2014). In the broiler industry, an increased prevalence of muscle diseases related to fast growth, known as “white striping” and “woody breast,” are estimated to have cost the collective industry up to $200 million in losses (Gee, 2016). Leading animal welfare scientists agree that higher welfare systems can result in long-term financial benefits from reduced mortality rates, improved health, improved product quality, improved disease resistance, reduced medication, lower risk of zoonoses and foodborne diseases, increased farmer job satisfaction, and consumer response to increased corporate social responsibility (Dawkins, 2017). These findings are being taken seriously by food businesses in the United States and across the globe, and have resulted in the adoption of commitments to improve welfare in animal production.

In addition to making changes in response to production concerns, food businesses must be aware of consumers’ growing interest in purchasing food that is healthier for them and the environment. For example, a recent market study found that 80% of consumers are interested in learning more about where their food comes from and how it is produced (The Center for Food Integrity, 2016). Animal welfare consistently ranks among the top concerns for consumers. For example, a 2017 survey conducted on behalf of the NCC found that 43% of respondents were concerned with the way broiler chickens are bred to optimize meat production, and a similar number were concerned with the ways chickens are housed and raised (Graber and Keller, 2017).

Trends indicate that as consumers demand more information regarding animal welfare issues, their concern about how farm animals are raised will continue to grow in kind, and may negatively impact their willingness to purchase animal products. Preliminary research on the correlation between media attention to animal welfare and meat demand in the U.S. has found that increasing media focus on animal welfare issues prompted consumers to purchase less meat overall, and that demand for pork and poultry was especially vulnerable to media attention (Tonsor and Olynk, 2010).

While consumers are generally becoming more aware of and interested in animal welfare, they are also concerned with specific issues that link animal welfare and human health—such as the use of antibiotics in animal agriculture, which has strong ties to the rise of antibiotic resistance (McKenna, 2017). The 2017 NCC study on U.S. chicken consumption found that 55% of consumers reported being "very or extremely" concerned about the use of antibiotics in chicken production (Graber and Keller, 2017). This concern is well justified: according to the World Health Organization (WHO), antibiotic resistance is "one of the biggest threats to global health, food security, and development today" (WHO, 2016). The overuse of subtherapeutic doses of antibiotics in animal agriculture is largely to blame. The *Report on Antimicrobials Sold or Distributed for Use in Food-Producing Animals* issued by the United States Food and Drug Administration (2016) states that in 2015, 34 million lbs of antibiotics were sold in the US for use in food animals. Furthermore, 62% of those antibiotics were in the "medically important"category; in other words, they are also used as therapeutic agents in humans and animals, and as such, their effectivity is jeopardized by antibiotic overuse and the rise of antibiotic-resistant bacteria (FDA, 2016).

Higher welfare and protein diversification: building resilience and sustainability in protein production

1. Higher welfare systems

Animal welfare plays an important role in creating resilient animal production systems that can result in a positive balance of outcomes for animals, humans, and the environment. Higher welfare systems help mitigate risks and vulnerabilities in the following areas:

- **Environment**: Because large amounts of energy and other resources are required to produce animal protein, animal agriculture will remain a resource-intensive activity regardless of production practices. On average, the conversion ratio of plant protein fed to animal protein produced is 6:1 (Pimentel et al, 2008). Similarly, all animal production systems will continue to produce byproducts that are detrimental to the environment, such as GHG emissions and agricultural runoff. However, higher welfare production systems have the potential to mitigate some of the environmental impacts of factory farming in three important ways:
    - Higher welfare systems encourage the reintroduction of animals into agroecological systems; namely, by putting animals back on the land. In mixed farming systems, animals can effectively convert resources that cannot be consumed directly by humans, such as pasture, into animal protein, while also

contributing to soil fertility. Soil health is known to be one of the primary factors that determine our ability to continue sustaining the production of food, fuel, and fiber, and is the single most important indicator of adequate land management (Doran, 2002). In addition to contributing to soil health, higher welfare systems that incorporate grazing play an important role in carbon sequestration; for example, a study of grazed and ungrazed grasslands in the North American Great Plains found that grazed lands stored 24% more carbon than ungrazed lands (Derner et al, 2006).

  - As good welfare becomes acknowledged as one of the costs of sustainable animal production, rather than as a simple externality, it draws attention to other costs that have thus far not been considered within the definitions of productivity and efficiency in animal production, such as climate pollution, land degradation, deforestation for feed production, damage to biodiversity, and impacts on human health (CIWF, 2009).
  - Higher welfare systems have demonstrated great potential to reduce environmental impacts in the long term. For example, a review of approximately 130 studies on farm-level energy use and global warming potential of organic and conventional farming systems found that, in general, organic farming systems resulted in significantly lower energy use and greenhouse gas emissions per hectare, and higher energy efficiency (energy input/output) per unit of product (Lynch et al, 2011). Furthermore, a number of studies have also found that diversified production systems (including agroforestry and crop diversification) play an important role in fostering resilience in agricultural systems in the face of climate change (Kremen and Miles, 2012).

- **Consumer benefits**: According to market research, increasing the availability of higher welfare products may be one of the best ways for animal protein producers to remain relevant in the marketplace. For example, a market report for poultry in the U.S. indicates that although overall sales of poultry were down in 2016, sales of “free-from” and “feel-good” poultry actually increased in that same year (Mintel, 2016). This report also found that 34% of surveyed consumers believe that poultry manufacturers should take better care of their animals—and in some cases, these preferences are clearly translating to increased sales of higher welfare poultry. For example, a U.S. brand of chicken with a third party animal welfare certification reported a 22% increase in sales in 2016 (Mintel, 2016). Consumers have also expressed a willingness to pay more for meat from animals raised in better conditions, including production without routine use of antibiotics. An analysis of surveys conducted between 1993 and 2016 on consumer perceptions of farm animal welfare found that between 12 and 40% of consumers are willing to pay a premium for higher welfare products, ranging from 1 to 30% over the base price (Animal Welfare Institute, 2017). In a recent U.S. poll conducted by the Consumer Reports National Research Center, 86% of consumers expressed that meat raised without antibiotics should be available in their local supermarket, while 61%indicated they would pay five cents or more extra per pound, and 37% indicated

they would pay $1.00 per pound or more extra for meat and poultry raised without antibiotics (Bohne and Halloran, 2012).

- **Use of antibiotics:** It is essential for animal welfare to be improved in order to responsibly reduce or eliminate the use of routine antibiotics in animal production. In factory farming, the two most common uses of antibiotics are as growth promoters and to prevent disease in animals that have been pushed to their biological thresholds and raised in environments that are not conducive to good welfare. High stocking density, which is a common feature of intensive production systems, limits animals' ability to perform welfare-positive behaviors, and also entails increased competition for resources. This competition can, in turn, lead to stress and compromised immune function. For example, laying hens exposed to stress have a higher risk of producing eggs contaminated with *Campylobacter*; and under similarly stressful conditions, broiler chickens are more susceptible to *Campylobacter* and *Salmonella*, two of the most common foodborne pathogens (Humphrey, 2006). As pointed out by one major U.S. poultry producer who recently committed to higher welfare standards for broiler chickens, the goal is to get to a point where antibiotics are no longer needed to sustain production. Improving animal welfare is a fundamental part of the strategy necessary to achieve that goal.

2. Protein diversification

While higher welfare systems are effective in mitigating environmental, social, and economic risks, animal production will remain a resource-intensive practice even in the best case scenario. As pressure on increasingly scarce resources builds and human populations grow, the risks outlined above can only be adequately mitigated by expanding protein portfolios to include plant-based options.

While higher welfare animal production has the potential to be a more sustainable model in the long term, it cannot single-handedly address the economic concerns of businesses shifting consumer demands around protein sources, as well as rising production costs. The solution to the long-term social, economic, and environmental sustainability of food businesses, as well as their ability to effectively contribute to global food security, will depend, at least in part, on strategies to diversify their protein offerings to include plant-based options. This diversification not only helps to mitigate economic risk, but also responds to a growing demand for diverse sources of protein. According to Mintel, the global leader in market intelligence: 113 million Americans are now choosing alternative proteins on regular basis, and sales of plant-based proteins grew at least 9% per year in 2014 and 2015, with total sales in 2016 exceeding $5 billion.

In the United States, producers and food businesses are already taking the opportunity to diversify their protein portfolios by investing in plant-protein companies, increasing their plant-based offerings, and prominently featuring plant-rich options[4].

Conclusions

True sustainability demands the ability to effectively continue a practice over time, either at the same level or with the expectation to grow in response to increasing demand. For a resource-intensive industry like animal agriculture, expectations for growth are constrained by increased demand on resources, as well as fluctuation in prices and availability. In addition to these pressures, animal production is now more heavily scrutinized by consumers than ever, and they will continue to demand not only higher welfare for farm animals, but also transparent reporting from food businesses. In this sense, implementing higher welfare practices is not only smart business, but may be the only path to sustainable growth for the industry. In addition to higher welfare considerations, food businesses must also look to "future-proof" their growth by diversifying their portfolios to include protein options that do not carry the same risks as animal production. A business that is effectively attuned to its changing role as a producer or purchaser of socially responsible, high quality protein is one that is not only fit for purpose, but also fit for future.

[4] Tyson, General Mills, Maple Leaf and Campbells have already invested to diversify their protein portfolio to include plant based proteins.
Tyson's CEO, in an investor briefing February 21, 2017, recommended Beyond Meat, which Tyson owns 5% of, as a product that was not only good to eat, but could help toward sustainably feeding the world.
Compass Group, the largest foodservice company in the world, has committed to purchasing less animal products, promoting a 'plant forward' diet. In 2009, Compass Group launched the Be a Flexitarian Campaign that promotes substituting plant based protein for animal protein one day a week. Compass Group has established a relationship with Hampton Creek to replace eggs in mayonnaises, dressings and other products. Hampton Creek has successfully replaced 10s of millions of eggs from the market with a cheaper, more sustainable plant based product.
As part of Aramark's *Healthy for Life 20 by 20* commitment with the American Heart Association, 30 percent of the main dishes Aramark serves across its dining operations in Healthcare, Higher Education and Business Dining are vegan or vegetarian.In 2017, they also announced that they will be conducting a series of plant-based culinary trainings as part of its ongoing efforts to develop strategies that increase plant-based food offerings for consumers.
National burger chains Burger King and White Castle have introduced a vegetarian burger. Noodles and Company and Panera Bread both refer in their policies to aspiring to include more plant based options on their menus.
Whole Foods Market has placed the Beyond Meat Burger, a plant based burger, in the meat counter. Beyond Meat reports seven times faster sales due to this placement when compared to placement in the vegetarian section.
Cargill became the first global meat manufacture to invest in the clean meat (cellular agriculture) space by investing in Memphis Meat.

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