

## **Executive Summary**

The Bonsmara breed in America is positioned to revolutionize beef production in the U.S. because, given the appropriate production system in the right environment (any warm environment including most of the “cow country” in the U.S.), the breed can yield beef that is tender when lean and do this in a manner friendly to both the animal and the environment. American emphasis on marbled beef creates a very competitive atmosphere for that product but emphasis and focus on this single trait yields products that vary greatly in tenderness since degree of marbling is unrelated to tenderness (tenderness is a matter of muscle structural proteins and connective tissue). As shown repeatedly in the American Beef Quality Audits, the overriding sensory attribute of importance to American consumers is tenderness. Although the competition for producing marbled beef is intense, there is little competition for producing the tender, lean beef that many American consumers want. Although marbling is important for beef flavor, the character of the muscle is too. The level of marbling in lean Bonsmara beef combines well with the character of its muscling to provide robust beef flavor. The American beef consumer is increasingly health and environmentally focused. Marbled beef is neither healthful nor produced in a manner friendly to the environment while natural, tender, lean beef from cattle adapted to their environment is good tasting, good for the eater, and its production engenders much less greenhouse gasses. This document describes not only how this can be done but also how the tenderness consistency when lean can be improved. The document describes how American Bonsmara builds on its roots in South Africa providing continuity and credibility for the Bonsmara breed in the Americas and for Certified Bonsmara Beef as well as a roadmap for future development of the breed and the beef in the Americas. The organization to accomplish this is the Bonsmara Association of the Americas (ABA) franchise. The licensing package required for the franchise is described herein including the steps for membership: 1. Application, 2. Acceptance by the board, 3. Self verification of Bonsmara cattle to be registered, 4. Confirmation vis inspection by the ABA, 5. Registration of Bonsmara cattle in the ABA.

### **Article 1. Justification: The Stage is Set.**

#### 1. The Breed.

- 1.1. The Bonsmara breed is a unique genotype in that it is a synthetic developed for specific adaptation to harsh climates from breeds selected for their beef quality. Dr. Jan Bonsma developed the breed at the Mara station in the hot, arid South African climate (north of the Tropic of Capricorn, Bonsma, 1985) comprising 5/8 Afrikaner and 3/8

British breeds (Hereford and Shorthorn). The parent cattle were selected from strains developed over many years by the Dutch, English and indigenous South Africans.

Bonsmara is among an elite group of breeds both productive and adapted to hot climates yet having little or no Zebu breeding (5/8 Africaner [*Bos taurus*, Sanga or Africanus subspecies], 3/8 British [*Bos Taurus*]) thereby providing genetic propensity for the opportunity for producing tender beef in subtropical and tropical climates. The parent breeds had been selected for adaptation to hot climates and for production performance (Chan et al. 2010; Bonsma, 1985). This selection also enables the breed to produce tender beef in that the animals have less heat stress in these environments but also have the ability to grow rapidly when provided a nutritious diet allowing the opportunity for them to be youthful at harvest, a trait important for beef tenderness (Makina et al. 2016; Strydom et al., 2000)

- 1.2. Although Dr. Bonsma didn't select specific genetics on the basis of beef quality (his primary interest was adaptability to harsh, hot environments), the fact of the selection of the foundation non-Zebu breeds gave rise to the subsequent verification that the beef is tender, juicy, and flavorful even when lean (Strydom et al., 2000; Holloway and Wu, 2019). The truism is that the only reason to husband beef cattle is if people like to eat the beef.
  
- 1.3. Although the breed was developed primarily for specific adaptation to harsh climates, a parallel goal was also that its production traits be such as to provide economic viability in its production. It is also a truism that the most adapted germplasm to harsh climates are the least productive (low nutrient requirements via low milk production, small mature size, and late maturation). Therefore development of the breed required tradeoffs of productivity and adaptability with the ultimate outcome being the best compromise enabling the production of beef

providing consistently a high quality eating experience at a reasonable price in harsh environments (Bonsma, 1985).

- 1.4. The salient character of the beef from the Bonsmara breed is that it can be tender when lean. This character can be refined but is the critical basis for Bonsmara beef brands (i.e. Certified Bonsmara Beef).

## 2. The Need.

- 2.1. Nutrient Rich Foods. The Americas as well as the entire world needs high quality, proteinaceous foods. This is the case for young people who need quality protein (balanced in the essential amino acids) for robust, healthy development. This is also the case for the aging population as well since the condition of sarcopenia is prevalent in people older than 40. Sarcopenia results in an insidious 3% loss in muscle mass each year after the age of 40 (by the age of 50, the muscle mass (protein content of the body) is reduced by 25%). This occurs concurrently with increases in body fat. The combination of decline in muscle protein and concurrent increase in body fat as people age results in a moribund (frail) aging population. This can be slowed or stopped only through an exercise program and consumption of lean, high quality protein. The highest quality food in the world is lean beef in that it supplies all the essential amino acids in the correct balance as well as the critically needed vitamins (especially the B complex vitamins) and minerals (especially iron) without excess calories (fat) (Holloway and Wu, 2019a,b).
- 2.2. Foods to Fight Obesity. A major nutritional problem in the Americas as well as much of the world is obesity. Eating fatty beef (i.e. marbled) increases caloric intake as compared to eating lean beef. This effect can be exasperated in people that attempt to control their weight with intermittent fasting or, more recently utilizing GLP1 injections, only altering the diet in terms of the quantity of food ingested. Because

these methods of weight control are difficult to maintain, the result is a “roller coaster effect” on weight over time with periods of weight loss and gain alternating. This roller coaster effect exacerbates the loss of muscle as people age because the weight lost is composed of both fat and muscle while the weight gained during alternating periods is mostly fat. The loss of muscle in the process of this “roller coaster pattern can be compounded with aging but also can be minimized by increasing consumption of high quality proteins during times of weight loss. The consumption of fatty beef (marbled) can do more harm than good for people on this roller coaster because it can exacerbate weight gain that naturally occurs after periods of weight loss.

2.3. Foods of Value. It is a truism that, no matter how nutritious a food is, if it is priced out of reach, that nutritious food cannot aid health and wellbeing except for the rich elite. These needed nutritional characteristics of beef, therefore, must come in affordable packages. This fact points to the need for animals that can convert fibrous plant (e.g., brush) lignocellulose endemic to harsh environments to this high quality food that is savory as well as high in muscle, low in fat. Sanga cattle have been shown to have greater browsing tendencies than other breeds of cattle (Radloff et al. 2013). Thus, when grass is limiting, they can readily utilize shrubs. The harsh environment of the world with the greatest opportunity for increases in production of the needed food is in the tropics and subtropics (e.g., southern U.S., and Central, and South Americas). Bonsmara is the only breed of cattle in the world bred to accomplish this “miracle” of transforming subtropical lignocellulosic rich plants into the most nutritious food in the world at an affordable price (Holloway and Wu, 2019b).

2.4. Savory Foods. It is also a truism that, no matter how nutritious a food is, if people don't like it, that nutritious food cannot be only of limited benefit. Also, everyone desires a pleasant eating experience to provide the platform for advancement of social and business relationships. Pleasant eating experiences begin with the center of the plate, the meat. Beef is the king of meats, not only because of its nutrition but

also because many people enjoy the experience eating it provides. The reason that marbled beef is popular is that it is perceived to be flavorful. The downside as discussed above is weight gain. Flavor is a complicated attribute of meats resulting from the Maillard reaction involving fat (oleic acid is important), muscle protein (glutamic acid is important) and sugar (glucose). Robust beef flavor involves a balance of these three components.

- 2.5. Tender Meats. Of the intrinsic quality characteristics (those that can be sensed at consumption, primarily tenderness, juiciness, flavor), the National Beef Quality Audits have consistently shown that tenderness is the most important and the biggest problem with the palatability of beef. This provides opportunity for a brand that is consistently tender.
  
- 2.6. Ethical Food. Also, people need to feel good about their food. This increasingly means they want to feel it is healthful, was produced humanely and in an environmentally friendly manner. Food has always been central to what man thinks about himself; it is integral to all religions (e.g., Passover lamb, Hindu sacred cow). Present ethical trends could be labeled a “new religion” built upon guilt with food being a major source of guilt. This trend is embodied in feeling guilty that our food is killing us (it is unhealthy), our food has required pain to animals (produced inhumanely), and that eating it contributes to global climate change (produced leaving a large environmental “footprint”). Bonsmara beef has the traits required for people to feel good about their food. This is the case because Bonsmara are generally docile (subject to humane treatment), adapted to harsh environments (for efficient production moderating methane emissions and environmental impacts) and can produce beef that is tender, juicy, and flavorful when lean (Holloway and Wu, 2019b).

### 3. A Natural Fit.

- 3.1. Nutrient Rich Foods. As indicated above, lifestyle trends in America are toward providing the body with all the nutrients it requires efficiently (nutrient dense foods). This entails consumption of highly nutritious foods in as small amounts as possible. As indicated above, beef is the most nutrient dense food in the world. The only dilution to these nutrients is fat content. As the fat content of beef increases, its vital nutrient density (i.e. protein, vitamins, minerals) decreases. Thus there is a nutritional need for the kind of beef Bonsmara can produce; high in vital nutrients in relatively small servings.
  
- 3.2. Foods to Fight Obesity. The happy coincidence is that the vital nutrient dense beef that Bonsmara can produce is the kind of food that creates a feeling of satiety without the ingestion of large amounts of fat (as in the consumption of highly marbled beef). Bonsmaras have been shown to be facultative marblers. That is, they can be fed in a manner to cause them to marble or not. Thus there is a nutritional need for the kind of beef Bonsmara can produce; high in vital nutrients but not calorie dense (fat has 2.25 times as much calories as sugar). Bonsmara Natural Lean Beef, therefore, can be consumed by weight-conscious people during intermittent periods of fasting or GLP1 medication without fear that the weight loss entails muscle deterioration. Also, consumption by young people can assure robust growth free of development of obesity and by older people to reduce the debilitating effects of sarcopenia.
  
- 3.3. Foods of Value. As indicated above, value is also a matter of nutrient density (nutrients consumed/nutrient cost). Value can be accrued through reduction in the cost of production or stated another way through increased efficiency/sustainability of production. The major way that efficiency can be increased in beef production is by aligning the nutritional needs of the animal with the nutritional character of the environment as well as aligning the adaptive character of the animal with the stresses afforded by the production environment. Making these alignments decreases managerial requirements, on the one hand, for costly feeding and housing and, if not provided, reduced productivity (low reproduction or animal growth). As indicated above,

the Bonsmara breed was developed to accomplish productivity in harsh, hot climates. Therefore, when Bonsmara are produced in the large area of the beef-producing world, the result will be high value beef. Also, the production of lean beef requires much less costly grain feeding than production of marbled beef.

- 3.4. Savory Foods. The balance of fat (marbling), muscle (lean), and sugar (stored by the animal in muscle and the liver as glycogen) required for flavor can be procured in Bonsmara lean beef. Texas A&M performed a study with SYSCO foods showing that Bonsmara Natural Beef was more tender, juicy and flavorful than USDA Choice or Certified Angus Beef (Holloway and Wu, 2019b). This requirement of tender, juicy, flavorful, and healthful beef is a perfect fit for Bonsmara beef in that it is not only nutritious (high in quality protein, available Fe, etc.) and low in calories (fat), but also can be tender, juicy, and flavorful when lean (Holloway and Wu, 2019b). The beef industry's focus on marbling has ignored the fact that for robust beef flavor a balance is required, not just marbling. A long-term trap has been for mankind to focus on improving one aspect of life with improvement cast as maximizing this aspect ignoring the fact that optimum is not usually synonymous with maximum.
  
- 3.5. Tender Meats. Unfortunately, for most tropically adapted breeds of cattle, heat adaptation is accompanied by toughness of the beef. This may at least partially be explained by the fact that most animals have evolved a method to manage the worst damage that heat can cause, shock resulting in death or debilitation. Heat shock results in a coagulation of proteins in the nerves. To prevent this Zebu cattle have evolved heat shock proteins (HSP's) that "chaperone" nerve proteins preventing coagulation and heat shock. Unfortunately, these HSP's also prevent complex muscle proteins from breaking down during postmortem aging of beef resulting in beef toughness (Lomiwes et al., 2014; Carvalho et al., 2014; Holloway and Wu, 2019). Apparently, Sanga breeds evolved other mechanisms to adapt to heat because postmortem aging of their beef results in tender beef. Also, Sanga

breed possess genes other cattle do not have enhancing calpain enzyme action postmortem tenderizing the beef (Casas et al., 2006a,b).

Another reason that Bonsmara beef is tender is that their gentle nature means that they are less stressed at the time of harvest (Falkenberg et al., 2005). If an animal is stressed at this time, postmortem aging may be ineffective (Holloway and Wu, 2019).

- 3.6. Ethical Food. As mentioned herein, the happy coincidence is that contented animals (those robustly adapted to their environs and that are in harmony with their husbandmen) produce the kind of beef characterized above as what many people want in terms of assurance the beef is healthful (as noted in 1.3.1 and 2), was produced in a humane manner (as free of animal stress as possible because of its gentle nature and adaptation to stressful environments as in 1.3.4) and this adaptation results in production having a small environmental footprint (Capper, 1977; Gerber et al., 2015; Holloway and Wu, 2019). Therefore, there is not only a big market for the kind of beef Bonsmara produces but also a big market for the cattle producing this kind of beef (Holloway and Wu, 2019a,b). Because America is free of a disease that prohibits free access to the world for Bonsmara genetics (Foot and Mouth Disease and in southern climates, Blue Tongue), America has the opportunity to not only supply the world with Bonsmara beef but also with Bonsmara genetics.