ULTRASONOGRAPHY TO PREDICT THE CAPACITY AND QUALITY IN LIVE BEEF CATTLE. CURRENT SITUATION IN LATIN AMERICA AND HOW WE CAN USE IT TO IMPROVE A MEAT MARKETING OBJECTIVE

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Introduction: From the beginning of the 90s, the people of INTA-Balcarce works and researches in this discipline of ultrasound. We begin in 1997 in the region (Uruguay, Argentina and south of Brazil). In Uruguay, we began doing many field tests in different breeds and species (cattle: Hereford, A. Angus, Limousin, Simmental, Charolais, Brangus, Wagyu and sheep: Texel, R. Marsh, P. Dorset, Corriedale). In addition, we worked in a research of INTA M. Juárez - Córdoba in Argentina, to find the best quality and uniformity of carcasses for export. After that, we collaborate with some teachers in the dissemination of this technology in Latin America (Chile, Mexico, Colombia and Central America). In 2000, in Argentina was created the Image Interpretation Center at INTA-Castelar. From these images, this Center develops the EPDs and Carcass Merit, mainly for A. Angus, Hereford, Brangus and Braford. In Chile, INIA was made some research and since 2006, we made several times Marbling measures in Wagyu breed and crossbreeds, to check their levels of Intramuscular Fat (IMF). In Brazil, many researchers and professionals work in Bos Taurus and Bos Indicus. In Mexico we did technical support for some Universities and researchers since 2003, and collaborate in developing a selection program for the Simmental-Simbrah Association in 2006. In Colombia, the Universities are integrating this technology and AsoZebu use it to select their animals. Today, there are many Universities, Associations, Companies and Private Professionals across the continent working on it.

Material and methods: For this task, it’s better to have a special ultrasound equipment with animal science probe, very wide (17-18 cm) and a special standoff-pad to fit the animal’s back. There are only 3 or 4 machines internationally approved to make this special measures: REA = Rib Eye Area, BF = Backfat, P8 = Rumpfat, IMF = Intramuscular fat. These measures (REA, BF, IMF) are taken in the area last intercostal space at the back, and rumpfat (P8) at the rump area (the middle point between hooks and pins), where the glutes medius inserts. It’s important to hold the animal in a safe of chute, clean the study area and if it’s possible, cut the hair in the region, which facilitates make good pictures (normally, it’s not allowed in pedigree animals). It’s needed a coupling agent, and we ever use vegetable oil (warm). Immediately, put the transducer with the standoff, parallel to the ribs, across the longissimus dorsi muscle, and try to get a good image of the muscle to perform the measurements. When you are correctly in the intercostal space, will observe the movement of the diaphragm on the right side and bottom of the screen. After freeze a good image, you can measure the BF (in a special place - 3 / 4 wide outer muscle) and REA (drawing the boundary of the muscle). For the other measures, don’t use the standoff. For IMF you place the probe in the last intercostal space, but longitudinal to longissimus dorsi, trying to get a homogeneous picture and placing the Quip Index box between the 12th and 13th rib. The software (internal or external) measure the white and black pixels into this box and bring the IMF value (%). In some countries, the images are sent to Interpretation Centres, where are processed and stored for EPD’s. In this cases, the professional must send 6 or 7 images, well documented and without mistakes (REA+BF+P8+ 3 or 4 IMF). In these last years, we have begun to work on measurement of fat thickness and loin depth, using common transducers, like the linear for reproduction and the sector included. With these common and simple equipments, used by many veterinarians, you can make measurements or calculation the Finishing of the animal, measuring the BF between 12 and 13 ribs, and predict the REA with the measure of muscle depth with good correlation.

Discussion: We can define clearly two lines or areas to work with this technology: 1 - the animal selection from meat capacity and quality, and 2 - prediction of quality and performance prior to slaughter. In animal selection, we use this non-invasive method to qualify the meat production potential and carcass composition of the breeders, to perform a ranking of the animals studied, and select according to the producer’s target or the market’s needs for the consumption of quality meat. As we know, the REA measure has positive correlation with the proportion of retail cuts in the animal and the amount of meat on the carcass. Besides, the heritability of this feature is very important and has negative correlation with BF. In the breeder’s farms we usually take all measures for each animal (REA, BF, P8, IMF) and store them for registration and selection, in addition to use it like a marketing tool to sell the animals. In some countries, these stored images are sent to a Image Interpretation Center, and there are processed and evaluated, to make EPDs and Carcass Merit. This information is important for different Beef Breed Associations, looking their efficient improve lines. In the other side, other important use of ultrasonography, is to predict the quality and meat performance prior to slaughter. In this issue, we can use all the measures (REA, BF, P8, IMF) or we could use a simple ultrasound machine (ex.: for reproduction) to collected BF and Muscle Depth (in the same place when we take BF). In very lean and young animals, could be necessary to make the measure in P8, because the IMF it’s almost impossible to measure.

Which is the main concern of the feed-lot producer: when the animal is just fattening to send to slaughter? Is it homogeneous the group of animals that go to slaughter? Normally, there is a tendency to underestimate or overestimate the termination of the animals, and there is no a good system of classification and standardization to provide reliable objective information about the live animals. We need an objective method to certify, measurable, and able to demonstrate that the quality offered matches with the quality expected. This method is Ultrasonography. Remember that the carcass must have at least 3 mm of fat cover to avoid the problems of super-cooling and darkening. To be safe, we recommend that the measure of BF should be between 5 and 8 mm, because when the hide it’s removed, could be include part of the fat layer on it. If we have excess fat, this carcass will be rejected or will have much dressing, and that fat is too much expensive (each mm it’s a lot of days on feed). Besides, we can take the measure of the muscle depth (longissimus dorsi) in the same line to take the BF, and use a correlation factor to get the approximate REA. The Muscle Mass Index (MMI) is obtained from the division of the REA to the Live Weight, and should be higher than 0138. In the hindquarter of the carcass, if the butt has a convex shape, the MMI will be up to 0.15, obtaining a very good yield grade. The average animals have 0.13 of MMI (linear butt), and the poor yield grade animals have 0.12 or less (concave butt).

In feedlots, we can perform a previous classification by the level of fat when the animals enter to the system. Animals with 3 mm or
more BF need less than 100 days to finishing (about 800 kg of feed), but animals with less than 3 mm of BF will required 1000 to 1200 kg of feed. We must not exceed 7-10 mm of BF, so it’s recommended to continuously monitor the animals that are close to the ideal point to slaughter. It’s another easy use of this technology to achieve efficient use and management of animals, meat production and the food. Several years ago, we proposed in our region a kind of approximation to a “Carcass Evaluation System”, but we had a series of obstacles and problems to achieve an agreement among all members of the meat production chain. We would like the breeders, feedlots, slaughterhouses and all those involved into the meat production chain, will find a good system of paying for quality. It’s necessary goodwill of these people and ultrasonography could be a predictive and more objective method to assist in the marketing of meat.

Conclusions: Widespread use of ultrasound as a selection tool in beef animals, looking their potential production and meat quality, making objective measurements in live animals and correlating these with what will get in the carcass. If we can popularize and demonstrate that these techniques are simple, practical and more objective for marketing relationship between the producer and buyer, we will have taken a big step to improve this big problem we have in all our countries. Sorting on time the animals going to the feedlot, as well as monitor their development of meat and fat, in order to send them to slaughter at the right time. So we can increase production efficiency, streamline the food, and have homogeneous herds, the main issue required for the meat industry. If the ultrasonography is introduced into the meat production, there will be a more objective marketing, will be on firm foundations, and then, with the cooperation and willingness of all participants in the production chain, all links will have their benefit. It’s not an easy task, but we made and will be make our best effort to achieve this target.

Key words: ultrasonography, carcass, selection, beef cattle, meat production.

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