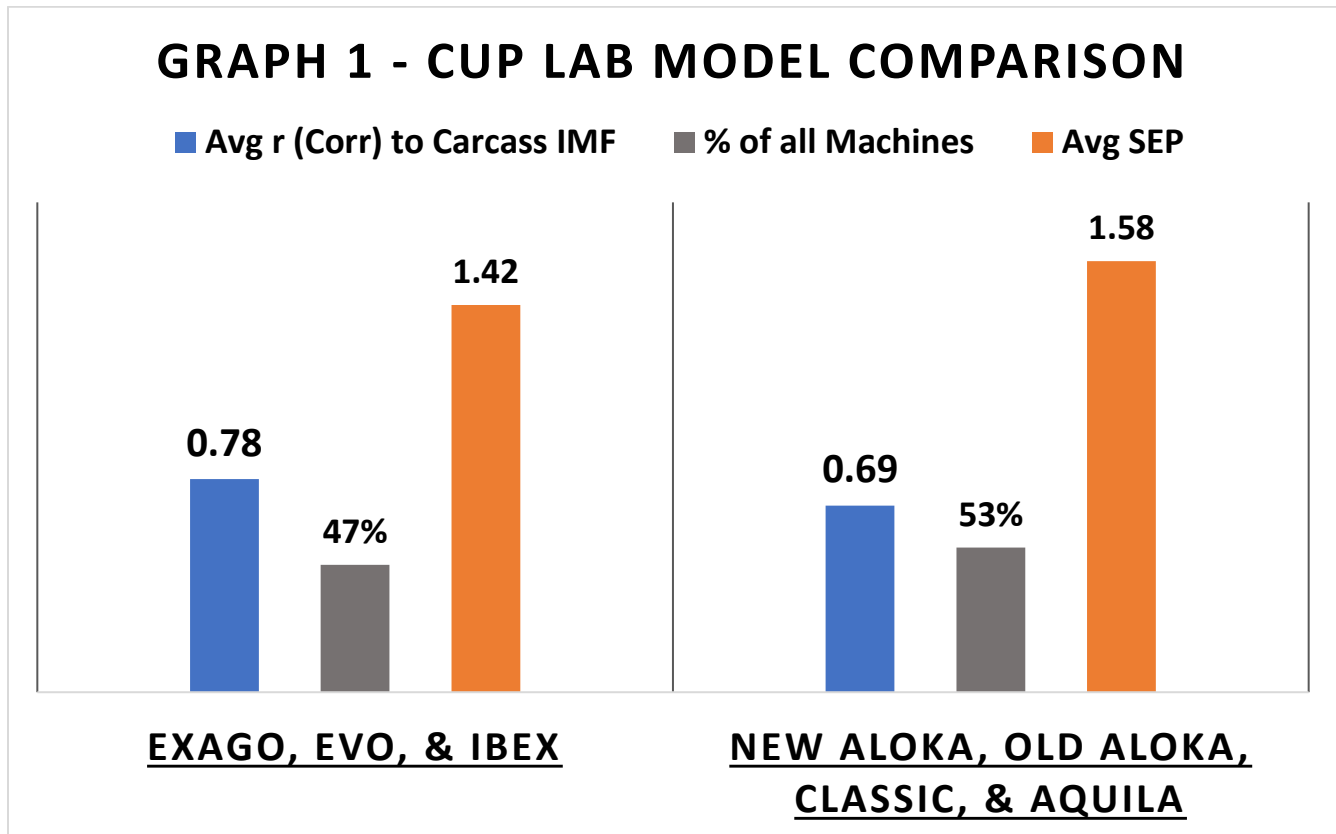




Memo: Statistical Comparison of CUP Lab® IMF Models for Different Scanning Systems  
To: Field Techs  
By: Mark Henry, CUP Lab®, LLC  
Date: 12/15/2022

We are excited to get this information into your hands to show why we have been promoting the adoption of new ultrasound technology. Below are two graphs, the first showing results from CUP Lab reported IMF values compared to carcass from the last four UGC Field Certifications. UGC systems certifications are a great beginning, but data from field certifications are the best model validation because it represents all active technicians using their personal systems in a real-world test.

Graph 1 shows average correlation ( $r$ ), % of machines represented, and average standard error of prediction (SEP) from the four most recent UGC field certifications (2019 through 2021). Only passing technicians are included. If CUP Lab had a model to interpret the images from a technician, we submitted their data no matter which lab they may use. (The 2020 CUP Lab field certification was not included because there was no carcass data collected. Data from 2022 West Texas A&M certification was not yet available at the time of this writing.)



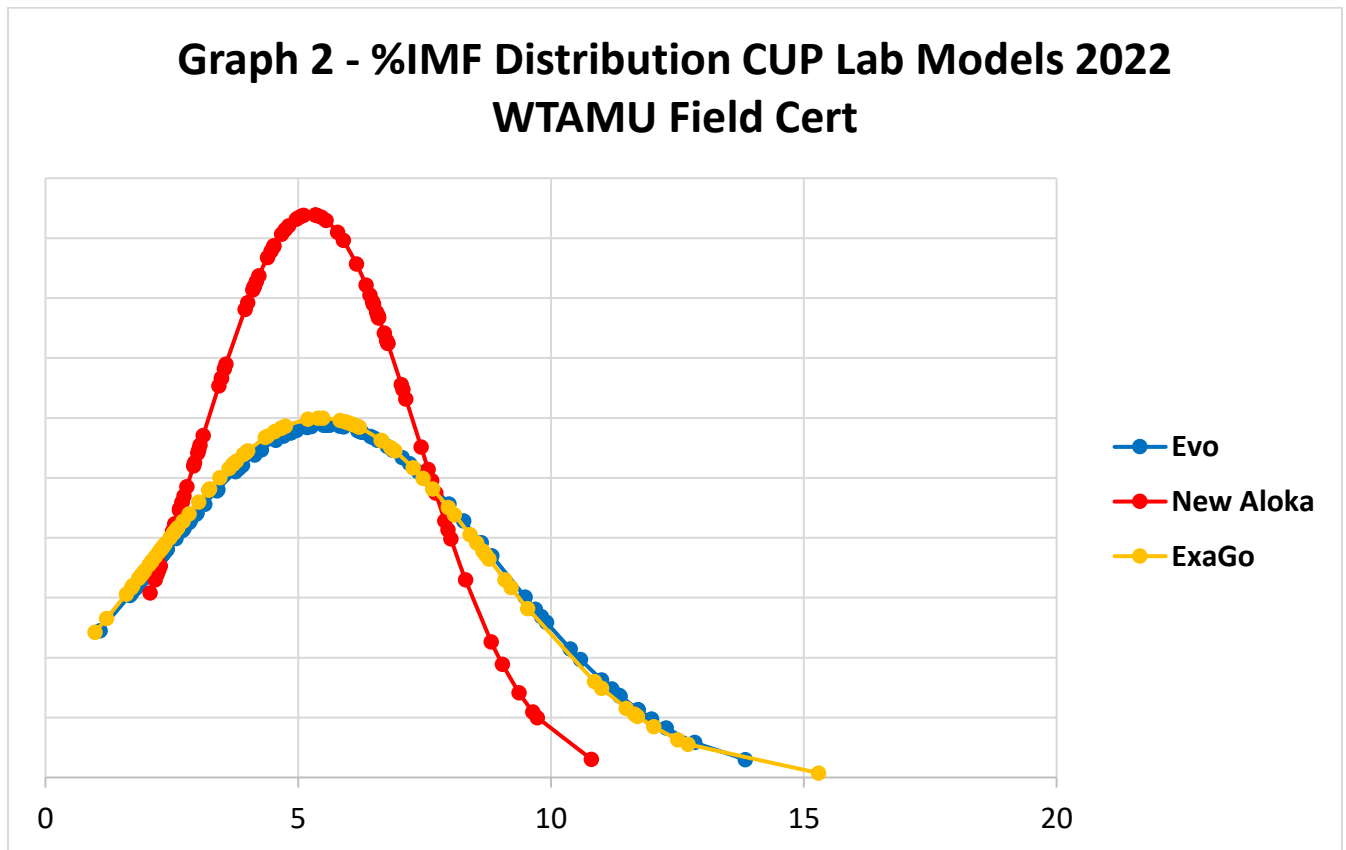
Certification statistics are dependent on the quality of data. We note that there was significant variation between field certifications regarding correlation along with some variation in standard error. However, all labs were compared to the same carcass data so UGC believed that averaging statistics across these 4 certifications was valid and useful. We agree that these numbers represent what we see in our lab every day.

The models CUP Lab developed for ExaGo, Ibex, and Evo have been better than anything we have seen. New Aloka and Aquila with the Elgato frame grabber underwent the same model development protocol and while both saw improvement compared our older models, neither could replicate the higher correlations and standard deviations we see with the ExaGo, Evo and Ibex.

A correlation difference of .09, might not look like much, but the 14% improvement is highly significant. A 10% reduction in SEP also moves the accuracy needle in the right direction.

The majority of 111 machines represented here are New Aloka and ExaGo, by a large margin. We saw that the ten Evo and Ibex technicians performed as well as ExaGo while thirteen technicians using Old Aloka, Aquila and Classic actually performed less accurately than those with New Aloka.

Graph 2 illustrates the CUP Lab IMF distribution curves representing 3 technologies in the most recent 2022 West Texas A&M field certification. Day 1 and 2 had different sets of cattle to scan. New Aloka and Evo are data for the two field reference technicians who scanned both days. ExaGo is a combination of two certifying techs, one from each day.



The difference in bell curves is typical what we see regularly here in the lab. CUP Lab models for the new system report a significantly different population distribution than the old systems. When cattle have marbling variation the new technology will spread them much wider and flatter than the old. While not always noticeable, many times we see significant year vs. year changes from the upgraded equipment the year of adoption. We've received dozens of calls from breeders who have noticed the IMF value changes. We understand how this change can be jolting, but we have learned to celebrate it because we know we are describing their animals more as they would appear as a hanging carcass than ever before.

The resulting larger variation of ratios has a dramatic impact on EPDs. A larger spread in ratios translates to a larger spread in marbling EPDs. Genomics get a boost with the more accurate IMF data as well, making it easier to identify genomic markers. Ultimately, ranchers can make better selections with more confidence and improved results.

While almost everyone loves to celebrate their “good” ones, the story of marbling isn’t just about high IMF animals. With higher highs come lower lows. More spread with higher accuracy also identifies the low end within a herd. Ranchers identifying and dealing with those animals can dramatically improve the prevalence of marbling genetics.

Also enclosed is a one-page article written specifically to help explain changes in data in the transition year from old to new technology. New technology data should not be compared to previous years. When explained well, your breeders truly understand why the changes are necessarily good for them. They are smart folks seeking genetic improvement, but IMF value changes in a single year can be disheartening and confusing. Producers agree that ultrasound advancement is very good even though it isn’t painless. We are sensitive to that, but our goal has always been the same: to produce the most accurate data for selection, not for marketing. Accurate selection will lead to better genetics to market.

For those of you who have already moved to a new scanner, thank you. Your breeders thank you, even if they may not say it or realize it, yet. If you have yet to make the change, consider it very strongly and very soon. You are operating at a disadvantage for your business and that of your customers. We know there are economic considerations, but we ask that you think strategically. Breeders that don’t use CUP Lab are not seeing these advances in accuracy no matter what technology their technicians are using. Our models are exclusive. Too many breeders don’t realize there is actually a difference between models and labs. Take the time to educate your prospects and customers about this. They need to know that not all labs are the same.

Final Note: It has been immediately evident to both field techs and CUP Lab that there are definite improvements in image quality when the ExaGo system is adopted. Evo and IbeX systems can also see some improvement, but not like we have seen with ExaGo. The improved standoff, sharper interfaces, and larger image have led to better ribeye image quality across the board. As we move to higher IMF and at times more subcutaneous fat, intercostal boundaries get more difficult to image. ExaGo is my favorite system to scan with because it gives me the best opportunity to get a good image.

Contact CUP Lab for more information.

# A New Ultrasound Benchmark

By Mark Henry  
CUP Lab® LLC

Ultrasound data is not static and neither is the technology. In 2017 CUP Lab® certified new software for prediction of intramuscular fat (IMF) in live cattle. New digital ultrasound machines were adopted in order to replace old analog systems that had been used for nearly 20 years. Along with the advancement in equipment came advancement in programming allowing for improvement in the accuracy of IMF predictions. The combination of new CUP Lab software and new ultrasound equipment, IMV ExaGo®, EI Medical Evo®, and EI Medical Ibex®, have proven to be significantly better at predicting IMF. Similar to how advancements in cell phone cameras over the last decade have dramatically improved digital images, so too have we improved our ability to accurately see what is under the hide.

How has this affected reported IMF values that seedstock producers receive? When the scanning technician has upgraded to the new equipment, in nearly every herd, producers have seen a reduction in the group average IMF for bulls. Averages for heifers are equal or greater compared to previous years. In most herds, but not all, we have also seen a larger spread in IMF values from low to high. The increased spread results in lower and higher IMF ratios. It is fair to assume that carcass marbling EPD values are also spreading over a larger range.

We firmly believe EPDs are the best indicator of genetic potential for any given trait. However, if you still wish to review the adjusted data, realize that the new CUP Lab software has created a new benchmark and it cannot and should not be compared to data from old technology. It is important to consider that genetics within a given herd generally don't change dramatically from year to year. However, management can have a dramatic effect on carcass traits, and an upgrade to new ultrasound technology is a management change that affects actual IMF values.

If you are a stats geek like me, this next part is for you.

CUP Lab developed several IMF software models (algorithms) over the years. Each is matched exactly to the different type of scanning equipment used by the industry. Before a model is adopted it is rigorously tested by CUP Lab first and then by the Ultrasound Guidelines Council (UGC) Systems Review Committee. Additionally, and of significant importance, UGC has used their annual field technician certifications over the last four years to provide additional lab and model validation.

The results show when comparing CUP Lab IMF model data from ExaGo, Evo, and Ibex (new) to that of Aloka, Classic, and Aquila (traditional), we see significant improvement in correlation and standard deviation. We can fairly summarize that the CUP Lab models for ExaGo, Evo, and Ibex are 10-12% more highly correlated to carcass IMF than data from models for Aloka, Classic, and Aquila. Perhaps of even greater importance, we see 50-70% larger standard deviations with those new machines. They more closely match the standard deviation of carcass IMF therefore more closely matching the actual distribution curve of carcass data. This allows us to identify outlier animals on both ends of the spectrum better than ever before.

For the most accurate data available, producers should hire a UGC certified technician that uses an ExaGo, Evo, or Ibex and uses CUP Lab in Iowa as their interpretation lab. No other lab has access to these advanced CUP Lab models and software.

2/24/2022