Increasing input costs and tightening business margins are leading ranchers and producers to look for more efficient ways of raising cattle. GrowSafe System Ltd’s data acquisition platform (powered by Intel® technology) collects, transmits and analyses feedlot data to give cattle producers a precise tool to monitor the performance and health of an individual animal enabling real-time health management and operational decision-making. In an industry currently relying on visual identification of sick and market ready animals, GrowSafe automation enables significant improvement in production efficiency and profitability.

Feed represents a significant portion of the cost of raising cattle and those costs have been increasing every year making profitability more challenging for ranchers and farmers.

GrowSafe Systems Ltd's integrated hardware and software platform tracks biometric and environmental data while monitoring feed and water intake of each animal in a producer’s operation. These raw data are analysed by the GrowSafe* data acquisition computer powered by Intel® technology to give producers a daily list of animals that are exhibiting behavior outside the normal range.

“Feed costs represent about 70% of an operation's expenses so if you can reduce how much feed animals need to consume to achieve the same growth, it has a significant effect on profitability,” says GrowSafe Co-CEO, Alison Sunstrum. “We are treating each animal to the best of its own welfare, which makes good business sense.”

The price of feed has doubled in the last four to six years (despite major improvements in crop yields) so farmers need to start looking at feed efficiency to address profitability, explains Dr. Monty Kerley, PhD, Professor of Animal Sciences at University of Missouri, where he conducts research into improving feed efficiency and nutritional intervention, and genetic predisposition for feed efficiency. The university was one of the first in the US to install GrowSafe more than a decade ago when it was running on Intel® Pentium® processor-based PCs. Today the system is powered by the 3rd Generation Intel® Core™ i7-3770 processor.

“Feed efficiency is going to be the primary profitability determinant in animal production in the future,” Dr. Kerley says, noting decisions about feed that are made at the pen-level can be inaccurate leading to significant fluctuation in the performance of animals within that group.

“Before GrowSafe, I could study diet...
on a pen basis but that makes it hard to tease out the genetic spread and biological possibility," he says. "The problem with looking at averages is that there is a 40% spread within the population. Biological limits say 20% of animals will be above average and 20% will be below average so we wouldn’t have a way to pick up genetic differences if we weren’t able to look at the individual animal."

“If you manage animals as an average, just as if you manage anything as an average, you leave a great deal of money on the table," adds Sunstrum. Dr. Kerley's research has been able to improve feed efficiency by at least 10 to 15%, which could mean an reduced cost of gain of 16 cents per pound, which Dr. Kerley says could mean "survivability" for a cattle producer.

“I don’t know of any other technology that can give me the type of potential that we have now to improve profitability," he adds. "I am fairly confident we can take in-pen intakes, sort animals and decrease cost of gain by 10 cents or more (a pound) and that’s marketable. We would have never been able to see that without this technology."

**Speeding Data Analysis**

Each Intel-powered GrowSafe system processes about 60 million data points each day so it needs to report back reliably and accurately. Previous data acquisition computers featuring Intel® Core™2 processors could take up to six hours to run the nightly analysis. By upgrading to 3rd Generation Intel® Core™ i5 processors, which are currently specified by GrowSafe, this procedure now takes around an hour and a half.

“For us every advancement (in processing speed) means we can offer new products and add new features so for us it is really valuable," says Sunstrum. "Without advancements in the PC processor, we would not be able to do what we do."

GrowSafe programmers are able to develop new algorithms allowing GrowSafe to deliver additional insights into the well-being of every animal in a client's operation. In one case, a new algorithm identifies and flags abnormal behaviour which could indicate sickness at a very early stage.

“From the data collected, we develop a digital health profile for every animal and we trend his health against his previous records, his health against his pen-mates, and we are constantly deciding how well he is doing," explains Sunstrum. "We can see changes in behaviour and identify disease in the feedlot about four days before visual symptoms are expressed and about 24 hours before a body temperature change occurs. We can't necessarily tell them what disease an animal has, but what we're saying is there is a behavior change so it might be wise to go out and take a look at that animal."

Dr. Kerley says this kind of information might also help researchers analyse the effectiveness of different treatment options or even reduce the need for treatment in some situations. "If you don’t have to administer antibiotics, for example, that information not only has a cost saving but a public health component in terms of reduced antibiotic use. We are looking at individual intake behaviour in a pen on production scale setting and now we can interpret some fairly intricate signals from animals that can tell us things about the animal health."

**Big Beef Data**

GrowSafe runs on ranches, dairies, feedlots and universities around the world, and its data acquisition computers gather individual animal data on thousands upon thousands
of animals daily, which Sunstrum says is creating one of the largest animal data repositories in the world.

“This is really big data in a way that no person would think is actually occurring at the farm level,” explains Sunstrum. “When people think about big data, they think about huge servers and don’t really think about distribution amongst many, many really fast PCs. We’re running a distributed type of network that is really big data at its leanest application. We’re delivering important, real-time information to farmers, who are people you wouldn’t traditionally think about being in that ‘big data’ world.”

The “learning algorithms” running on this massive amount of animal data is allowing them to spot trends or issues that wouldn’t be evident to individual producers.

“It is big data on a PC platform and we are leveraging that PC to its absolute extent.”

**Heading Out To Pasture**

The Samuel Roberts Noble Foundation undertakes a considerable amount of research centered on stocker cattle production and forage-based cattle. “Our research looks into modifying or enhancing a practice or management approach to see if we can impact the bottom line of a producer,” says Senior Vice President and Division Director of the Agricultural Division, Dr. Billy Cook, PhD, who was first introduced to GrowSafe at a previous company.

Using GrowSafe*, Dr. Cook and his team are able to look at individual animals instead of pen-based responses, he can reduce the number of cattle needed for control group experiments.

“Traditionally, I would look at

somewhere between 80 and 100 head per treatment group. With GrowSafe, we can probably reduce that by 2/3, as the experimental unit is not by the pen but by the individual animal. There is such a wide variation between animal responses that this is truly quite valuable. The real value is I can measure individual responses that we have not been able to measure in the past.”

Dr. Cook adds that individual monitoring opens up new fields of research. “We spend a lot of time researching forages and forage systems for cattle. We are trying to take the next step with GrowSafe and take this technology into pasture and pasture production systems.”

Leveraging the GrowSafe platform to measure individual cattle weight and water consumption, coupled with other technology to monitor the speed at which pasture is disappearing, Dr. Cook said they're looking to better understand cattle performance on pasture.

“Historically, we might weigh cattle on pasture every two weeks, at the most. Now I am getting multiple indications of body weight daily so we can define the animal side of the equation better,” explains Dr. Cook, noting they are working with other technology to monitor and estimate forage availability. “It’s fairly preliminary but the results are looking promising. We are beginning to integrate the forage and animal sides of the equation.

"The results compiled and analyzed by the Noble data acquisition computer will help the Foundation make recommendations to producers on the best conditions or grass composition to optimize weight gain in cattle to improve profitability.

In addition, Dr. Cook says the research looks into genetics and breeding cattle for better feed efficiency.

**Challenge**

With feed costs continually increasing, cattle producers worldwide are looking to raise beef cattle more efficiently but benchmarking animals by the pen doesn't allow producers to account for performance differences in animals, nor the measurement of population genetic potential. At the same time, real-time health management and operational decision making is limited.

**Solution: Individualized Data Management**

GrowSafe System Ltd’s data acquisition platform collects, transmits and analyses millions of data points from feedlot production systems so GrowSafe recommends desktops powered by 3rd Generation Intel® Core™ i5 processors to its clients. Nightly data analysis includes an animal’s feed, water intake and weight gain, as well as many environmental and biometric factors, giving cattle producers a precise tool to monitor the performance and health of an animal.

**Impact**

- Upgrading data acquisition computers to desktops powered by 3rd Generation Intel® Core™ i5 processors cuts data analysis time from 6 hours to approximately 1.5 hours.
- Data collected from hundreds of Intel Core processor-based PCs lets GrowSafe leverage Big Data to develop new algorithms that improve animal health, nutrition and profitability.
“We have the ability now to identify phenotypes that we have not been able to capture before (and start breeding for that factor). Anything we can do to allow a producer to better optimize his forage will pay off at a high rate over time.”

“We are accumulating reams of data and we are digesting what we are seeing,” Dr. Cook says, noting the results are promising. They are seeing similar feed efficiency differences in animals whether they are in a pen or on pasture. “Some animals are 25% more efficient than others. That is a significant factor over a large number of cattle in a feed yard and we think we can see similar differences in production on pasture. If we can run more efficient animals on pasture we likely can reduce the overall forage demand of the grazing system, particularly during drought conditions.”

About GrowSafe Systems Ltd.
GrowSafe Systems provides automation tools and applications for livestock producers to maximize profitability. GrowSafe solutions are located in almost every major agricultural university across North America, in seven Canadian provinces and 22 US States, as well as Mexico, South America, Australia and the European Union.

About The University of Missouri
The University of Missouri was founded in 1839 in Columbia, Mo. as the first public university west of the Mississippi River and the first state university in Thomas Jefferson’s Louisiana Purchase territory. It is a major land-grant institution and Missouri’s largest public research university.

About Samuel Roberts Noble Foundation
Founded in 1945, the Samuel Roberts Noble Foundation is an independent, non-profit institute headquartered in Ardmore, Okla. The Foundation conducts direct operations, including assisting farmers and ranchers, and conducting plant science research and agricultural programs, to enhance agricultural productivity regionally, nationally and internationally.