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Managing risk in the futures and options market

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In risk management, a positive event is considered an opportunity and a negative event is considered a risk. In addition to identifying opportunities and risks, minimizing the probability of occurrence and evaluating the impact of a negative event are also major goals of risk management. Let's put some perspective around these terms to help clarify them.

Let's say I bet $1 on a coin toss with you, the reader. Under this scenario, I have the risk of losing and the opportunity of gaining. So far, we have identified the risk and the opportunity. Then we can quantify the probability of occurrence. Discarding the unlikely occurrence that the coin falls and stands on its side, there is a 50% probability that I will lose and a 50% probability that I will gain. So far, we identified the risk and evaluated the probability of occurrence. After identifying the risk and evaluating the probability of occurrence, we can now quantify the impact of such event, which is losing or gaining $1. Likely, the reader would agree that this scenario shows a low impact risk and, therefore, the reader might not hesitate to put $1 at risk.

What would the reader say if now I bet with him or her a $20-million farm by flipping the coin? How different is this scenario from the previous one? Well, the risk is still the same (either losing or gaining assets) and the probability of losing assets is the same (50%) as well, independently of whether I bet $1 or $20 million. Conversely, the impact of losing assets in this new scenario differs. Because losing $20 million is not the same as losing $1, the reader (and myself, of course) would likely be hesitant of putting at risk his or her assets in the latter scenario. As a partial conclusion, managing risk is a matter of identifying adverse events, evaluating the probability of their occurrence, and quantifying their impact.

Dairy farming systems are subjected to substantial uncertainty and, therefore, are exposed to risks of diverse impacts. A drop in milk price (the risk) will decrease farm revenues. The revenue loss (impact) will depend of the magnitude of the drop in milk price and the productivity of the farm. An increase in the price of corn grain (another risk) will increase feeding costs and operative expenses. Quantifying the impact will depend on the magnitude of the increase in corn grain price and the inclusion of corn in the diets. Similarly, an increase in fertilizer price (another risk) might increase feeding costs and operative expenses? Whether an increase in fertilizer price has a similar impact to an increase of corn grain price is another story. The truth is that multiple risks can impact the economic sustainability of dairy farming systems in different ways.

Managing risk through the future and option markets is a useful tool commonly used by large dairy farms. Something intriguing is why these tools are not used more frequently by smaller dairy farms. To "turn the tide" on this matter, the dairy management extension program from the School of Animal Sciences (previously known as the Department of Dairy Science) at Virginia Tech will develop and deliver educational programs in the Commonwealth of Virginia to help farmers understand how future and option markets work and how hedging prices can help manage risk in dairy farming systems. This extension program, which is funded indirectly by the National Institute for Food and Agriculture (NIFA) of USDA through the Southern Extension Risk Management Education (SERME) program, is a collaboration between Dr. Gonzalo Ferreira from Virginia Tech and Dr. Hernan Tejeda from University of Idaho. The goal is to deliver interactive workshops with hands-on activities that will help farmers, extension educators, and industry personnel understand the use of future and option markets to manage risk. Likely, these programs will be delivered during the winter in Rockingham, Franklin, Amelia, Smith, and Montgomery counties. We look forward to your participation in these programs.

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SOUTHERN EXTENSION RISK MANAGEMENT EDUCATION

CLOCK Genes Regulate Circadian Rhythm and Reproduction in Cattle

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Reproduction is the primary reason for culling on dairy operations. This is partially due to genetic selection and management for higher producing cows, which has depressed fertility by increasing metabolic stress and blood circulation among other mechanisms. This results in decreased estrus expression, delayed return to estrus post-calving, and irregular estrus cycles—all of which have a significant negative impact on dairy farm expenses. On the average size U.S. dairy farm of 300 cows, increasing days open from 90 to 100 days costs producers $3 per cow per day, resulting in $9,000 of increased expenses per year. Therefore, tools and technology to improve reproduction are crucial for dairy producers' profitability. Clock genes, which have long been known to regulate circadian rhythm in animals, have recently been investigated as a regulator of reproduction in dairy cattle. This article will examine the role of Clock genes in circadian rhythm and reproduction in dairy cattle and potential future applications to improve reproductive efficiency.

Circadian rhythm runs on a 24-hour cycle and is known as the body's internal clock. It includes metabolic, hormonal and behavioral changes that vary within a 24-hour period. Circadian rhythm primarily responds to light and dark exposure with one well-known example being the variation in melatonin and sleep schedule in response to light exposure. Light is detected by photoreceptors in the eye, which send a signal to the pineal gland and inhibits melatonin production. This results in increased melatonin levels only during periods of darkness. The pineal gland serves as the over-arching source of circadian rhythm regulation in animals; however, each body tissue also has a semi-independent circadian rhythm pathway that operates under the pineal gland.

Clock genes are a family of genes that aid in regulating circadian rhythm in various tissues and include a variety of genes that increase expression during dark and cause increased production of proteins which then in turn, decrease the Clock gene expression. The speed with which this feedback occurs sets the timing of the cycle, which is 24-hours in the case of most animals. Clock genes found in accessory body tissues can also impact cellular functions such as metabolism. However, little is known about how these pathways work.

Recent research shows that the bovine reproductive tissues have distinct Clock gene family expression, which seems to vary with fertility. When uterine tissue was collected and analyzed from lactating Holsteins prior to synchronization and transferring embryos to them, animals that settled the embryo and maintained their pregnancy had greater expression of one clock gene in their uterine tissue. This indicates a role of Clock genes in the uterine environment and altering uterine receptivity to embryos.

Another study measured the specific CLOCK gene expression in beef heifers that were super-stimulated. Embryos were collected and those heifers with CLOCK gene expression responded better to the super-stimulation protocol. These heifers produced 11 transferable embryos on average, compared to high CLOCK gene expression heifers which produced only 3 transferable embryos. This indicates that Clock genes interact at the ovarian level and regulate the ovary's responsiveness to hormones such as FSH and LH.

A third study in Nellore cattle looked at heifer pregnancy rates and antral follicle population, which is an indicator of an animal's responsiveness to a super-stimulation protocol. They found that the gene CRY1 had a strong association with pregnancy rate and antral follicle count, further indicating the joint role of Clock genes in ovarian and uterine regulation to impact fertility. It is proposed that the pineal gland could be impacting the ovarian clock in one of three pathways: 1) Nerve signals from the pineal gland directly stimulate the ovary, 2) pineal gland causes FSH and LH secretion which in turn stimulates the ovary and/or 3) pineal gland production of melatonin suppresses ovarian activity. Interaction with the uterus is thought to be mainly hormonal. However, further research is needed to determine the exact role of Clock genes at the ovarian and uterine level.

In summary, this research indicates a role of the Clock family genes in reproduction and fertility in cattle with specific impacts at the ovarian and uterine level. Potential future applications could include selecting for increased reproductively efficient animals based on Clock gene expression or altered lighting schedules to favorably impact reproduction. While additional data is needed to fully understand how these various genes can impact reproduction, Clock genes show promise as another tool for explaining reproductive difficulties and improving reproductive efficiency in dairy cattle.

Upcoming Events

All American Dairy Show
September 18-21, 2022

State Fair Junior Dairymen's Contest
September 23, 2022

Virginia State Fair – Dairy Weekend
September 23-25, 2022

World Dairy Expo
October 2-7, 2022

Cattle WISE/Equipment WISE-Women in Ag
October 21-22, 2022

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