

Sheep GEMS News Brief 1 – April 2024

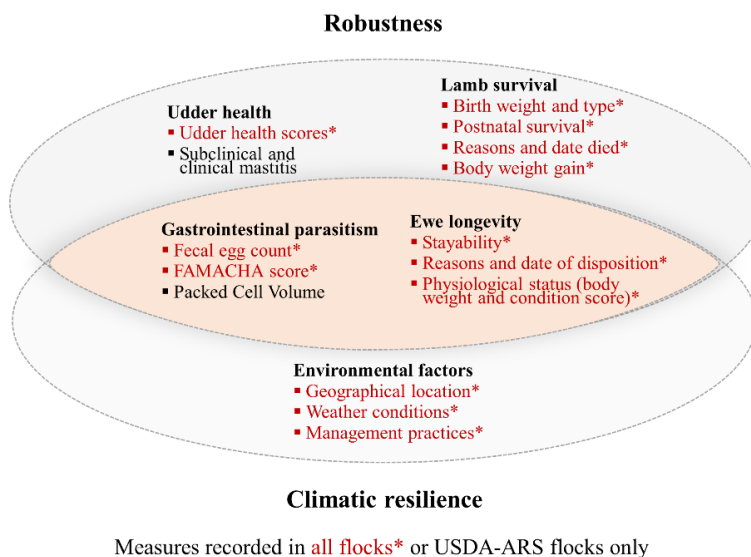
What is Sheep GEMS?

GEMS stands for Genetics, Environment, Management and Society, which are four pillars of our sheep industry. Why so? In the U.S., distinct breed-types are spread across climatically diverse regions and management systems. Breeding robust sheep that perform well under these conditions is therefore critical to the industry’s long-term sustainability. Currently, however, traits indicative of robustness and climatic resilience are largely absent in our genetic evaluation. Our ambition in Sheep GEMS is to remedy that shortfall.

Sheep GEMS has been underway for about two years, with exciting results generated. For those findings to be useful to sheep producers, they need to be widely shared. To begin that process, our providing further background into Sheep GEMS seems appropriate. That necessitates defining terms.

Robustness is an animal’s ability to remain healthy and productive (i.e., to survive and reproduce) within a defined environment or set of management conditions. **Climatic resilience** is an animal’s ability to either be little affected by, or capable of recovering from, changes in climatic conditions (e.g., extremes in temperature or relative humidity). An **indicator trait** is an on-farm measurement that helps predict an animal’s robustness or climatic resilience. As an illustration, fecal egg count is an indicator trait for resistance to gastrointestinal parasitism and thereby robustness.

The robustness traits incorporated into Sheep GEMS are lamb survival, udder health, and gastrointestinal parasitism (Figure 1). Our indicator traits for **lamb survival** are birth weight and type, early postnatal survival, and survival to weaning. For **udder health**, our indicator traits are udder depth and teat placement near lambing. Lastly, for **gastrointestinal parasitism** our indicator traits are fecal egg counts and FAMACHA scores collected in lambs and ewes at critical times.



We are assessing climatic resilience focusing on **ewe**

longevity. As its indicator trait, we are recording an ewe’s stayability, defined by her retention in a flock while remaining productive. Additionally, we are collecting body weights and condition scores on ewes at key physiological stages (e.g., breeding and weaning) and monitoring their changes over the production season.

Figure 1. Robustness and climatic resilience measures recorded.

Collecting these additional measurements is an ambitious undertaking. Our success in doing so depends on collaborations. Three USDA Agricultural Research Service (ARS) facilities are core to our effort: the

Dale Bumpers Small Farms Research Center; the U.S. Meat Animal Research Center; and the U.S. Sheep Experiment Station. Scientists at these facilities are recording the indicator traits we described (along with others) on their genetically connected Katahdin, Polypay, Rambouillet, and Suffolk flocks.

To impact the sheep industry, producers need to collect similar data in their own flocks. Therefore, in collaboration with the National Sheep Improvement Program (NSIP), we have recruited 45 NSIP flocks with these same four breeds to join the project.

Another aspect of Sheep GEMS is to incorporate genomic technologies into our genetic evaluations. Those tools allow us to validate pedigrees, provide genetic conditions for simply inherited traits, and more reliably predict genetic merit for complex traits like robustness and climatic resilience.

Sheep GEMS is in its early days. Still, our preliminary outcomes are promising. They set the foundation for providing the U.S. sheep industry with methods to further improve our flocks. We look forward to sharing our discoveries with you in the series of articles that will follow.

Scientific team. The Sheep GEMS scientific team is Ron Lewis (Project Director), Luiz Brito (Project Co-Director), Joan Burke, Carrie Wilson, Brad Freking, Tom Murphy, Bret Taylor, Luis Pinto, Sara Nilson, Artur Rocha, Hilal Yazar Gunes, and Ali Haider Saleem.

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