Update on the Sheep and Goat Project for Improving and Integrating Genetic Improvement Services in Canada

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In the summer of 2021, the Canadian Sheep Breeders Association, the Canadian Goat Society, the Canadian Meat Goat Association and several organizations that currently provide genetic improvement services for sheep and goats, namely the Centre for Genetic Improvement of Livestock (CGIL) at the University of Guelph, the Canadian Centre for Swine Improvement (CCSI), Le Centre d'expertise en production ovine du Québec (CEPOQ), Ontario Sheep Farmers (OSF), the Canadian Livestock Records Corporation (CLRC) and AgSights, launched a 3 year collaborative project.

The project is guided by a Steering Committee with representatives from each of the partner organizations listed above, with the support from three technical advisory committees with experts on databases, genetic evaluation and end-user software. The objective of the project is to improve genetic services for various species in Canada through increased collaborative work and better integration of current systems. This is achieved by undertaking short-term integration initiatives during the project and by evaluating further integration options for the longer term. Here is an update on what has been done so far.

Review of options for the registration system by the Database Advisory Committee: Registration is an important component of the genetic improvement of sheep and goats. Therefore, project partners provided assistance to CLRC in its efforts to acquire a new system, although development of a new registration system at CLRC is not a project objective. This led to an evaluation of the options that CLRC intended to pursue, based on a study of the current and future requirements of sheep and goat breed associations. Although these options will still be considered by CLRC, they were found to be costly and somewhat risky and put on hold for now. In the short term, CLRC is focusing on stabilizing the current system with support from CCSI's IT staff, with the goal of improving the quality of the registration service and reducing its long term cost.

Implementation of pedigree data exchanges between CLRC and GenOvis: The project supported an initiative to automate the transfer of registration data between GenOvis and CLRC. With the assistance of CCSI and CEPOQ, this transfer is now operational. This increases the completeness and accuracy of pedigree data for genetic evaluations, reduces data entry time for breeders and CEPOQ, and saves time at CLRC. In addition, tools developed for electronic registration in this task could potentially be adapted to work for goats or other species being registered at CLRC.

Strengthening GenOvis and Integration of CEPOQ reports for commercial producers into the CGIL GenOvis system: The project assisted with several initiatives to strengthen GenOvis, the Canadian sheep genetic evaluation system jointly supported by CGIL, CEPOQ, CSBA, and OSF. In the last few years, the system has been vulnerable, given the limited number of technical people to ensure its smooth operation, as well as back-up and knowledge retention. To remedy the situation, a new system manager (Dr Bacem Saada), who started at CGIL last November, has been working on IT support for GenOvis. In addition, CGIL hired a co-op student to modernize the GenOvis Web interface. A new post-doctoral geneticist, hired with government and industry support, will begin to work this year with Dr Larry Schaeffer to learn about GenOvis, and to carry out a research project to improve the genetic evaluation of lamb survival and its integration to existing selection indices. While this two-year position is jointly funded on the industry side by CSBA, CEPOQ and OSF, and while the University of Guelph is funding both the system manager and co-op student, the project has provided a new impetus for these initiatives. The project is also providing funding to CEPOQ and CGIL to integrate a series of reports developed by CEPOQ to allow commercial sheep producers to better follow performance changes in their flocks and to compare themselves to other flocks. The reports will be integrated once the GenOvis Web interface has been modernized.

Review of options for meat goat genetic evaluation by the Genetic Evaluation Advisory Committee and Development of pilot genetic evaluations for meat goats: Another short-term task launched by the project has been the review of options for genetic evaluation of meat goats, which subsequently led to development of pilot genetic evaluation for growth, reproduction and classification traits. The work was done jointly by geneticists from AgSights and CCSI, under the guidance of the genetic evaluation advisory committee with representatives from CGIL, CEPOQ, CCSI, AgSights and CMGA. Genetic evaluations have now been calculated and will be distributed this year to a pilot group of meat goat herds to get their feedback. While currently the number of meat goat herds that record and send production and classification data is relatively small, the expectation is that this number will increase over time as the program becomes better known. Also, the goal of this work is not limited to meat goats. The new evaluations make use of a genetic evaluation package developed in the Netherlands which is easier to maintain than the evaluation programs currently used in Canada for sheep and dairy goats. Thus the work opens the door for streamlining and integrating genetic evaluations for sheep and goats to increase efficiency and reduce cost. In addition, the new software can incorporate data from large marker panels that increase selection accuracy. Several countries are beginning to use genomic data for the selection of sheep and goats, and Canadian breeders will eventually have to do the same to remain competitive. This new development is an important step in that direction.

Merging of the CGS database with the goat genetic evaluation database: Another task is the merging of the CGS and CCSI databases for dairy goats, as requested by CGS. This will reduce costs for database maintenance and enhancements, increase functionality for both CGS office

needs and for genetic evaluation reporting, reduce operational costs for both CGS office needs and monthly genetic evaluations, and put CGS and CCSI in a better position to support further integration with others.

Standards for data collection and exchange: The end user software advisory committee has started reviewing data collected by project partners with the goal of standardizing it to facilitate data exchanges. At this point, standards have been proposed for a number of data formats including dates, sex, number born, number raised, weights, etc. This work will greatly facilitate future integration, by avoiding the need to convert data when exchanging it. The database advisory committee, for its part, has been looking at ways to streamline the use of databases, servers and software across sheep and goat organizations in order to increase efficiency.

New short term tasks under consideration: The project Steering Committee is in the process of considering and ranking several new tasks in addition to the above. For example, ways to increase enrolment into genetic improvement programs, applying the new software package to the genetic evaluation of dairy goats, making online registration for sheep and goats easier, jointly reviewing sheep and goat classification traits to make them amenable to future genetic evaluation, improving access to DNA data collected by all parties (such as DNA collected for parentage verification, or for Scrapie or Maedi Visna resistance or other markers), developing software to identify and rank rams or bucks for specific producer goals, and initiating a pilot project to evaluate the use of infra-red technology to better assess growth traits, reproduction and health status. While it may not be possible to carry out all of these tasks within the project, some tasks could be the subject of future projects if there is sufficient support from the industry.

Options for the longer term: The project partners are working to identify ways of further integrating genetic improvement services both during and beyond the project, with the aim of making these services more efficient and cost-effective, and ensuring their perennity. This is critical for the success of both the sheep and goat industries and could be extended to the integration of services with other species groups such as swine. One option under consideration is the creation of a network among partner organizations to facilitate cooperation during and after the project. This would not entail the creation of a new organization, but rather lay out the foundation for partners to share expertise, resources and software, or acquire them in common. The main areas of activity of the network would be genetic evaluation, including through genomics, the coordination of genetic research and data standards, and the creation and maintenance of data exchange systems. Other species besides sheep and goats might become part of the network if they are interested and share common objectives. Discussions on the above have been very positive at the Steering Committee level, but will be extended over the next year to the Board of Directors of partner organizations, to get their feedback and evaluate if there is sufficient support to move further ahead.

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