WORLD AYRSHIRE FEDERATION
MID-TERM MEETING – NOVEMBER 9, 2026
PROGRESS REPORT
International Ayrshire Genetic Data Exchange Project
Females in MACE – Progress, Opportunities and Next Steps

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1. Executive Summary

The International Ayrshire Genetic Data Exchange Project, developed through collaboration between the World Ayrshire Federation (WAF) and Interbull, represents an opportunity to strengthen international cooperation in genetic evaluation for the Ayrshire breed.
The Females in MACE initiative addresses an important challenge faced by smaller international dairy breeds: the relatively limited size of national reference populations available for genomic and genetic evaluation.
By incorporating female information into the international evaluation framework and combining information from several countries, the project has the potential to create a larger and more diverse Ayrshire reference population.
The project has progressed significantly since its initial development. Data from several participating countries have been brought together, and Interbull has been working on the technical requirements necessary to move the project toward operational international evaluations.
As the project develops, one of the questions that may be worth exploring is whether broader international participation could further strengthen the reference population.
In particular, it may be useful to discuss with the relevant organizations in **Sweden, Finland, Denmark and Norway** whether there is interest in the Females in MACE initiative and, if so, what conditions would be required for participation.
The potential contribution of these countries could increase the size, geographic representation and genetic diversity of the international Ayrshire reference population. However, the value and feasibility of broader participation would need to be assessed jointly with Interbull and the organizations concerned.
The longer-term development of the project could also provide opportunities to explore future international initiatives, including the potential relevance of InterGenomics.
The purpose of this report is therefore not to propose a predetermined structure, but to provide an overview of the progress achieved and to identify opportunities and questions that WAF may wish to explore collaboratively with Interbull and its member organizations.

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2. Background and Rationale

Ayrshire is an international dairy breed with populations distributed across a number of countries. Compared with some of the larger dairy breeds, however, the number of Ayrshire animals available for genomic reference populations remains relatively limited in individual countries.
This can create challenges for national genetic evaluation systems, particularly when genomic selection is used extensively.
The principle behind the International Ayrshire Genetic Data Exchange Project is to explore how information already available across national populations can be used more effectively within an international framework.
Rather than each country relying exclusively on its own reference population, international data can potentially be combined within the Interbull framework to create a broader population of animals and genetic information.
The Females in MACE project represents an important development in this approach because it seeks to incorporate female information into the international evaluation framework.

For Ayrshire, increasing the size and diversity of the reference population could potentially contribute to maintaining and improving the effectiveness of genomic selection.
At the same time, the benefits of broader data integration will depend on factors such as genetic relationships between populations, data compatibility, evaluation methodology, data governance and the objectives of the participating organizations.

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3. Progress Achieved

The project has moved from the initial research and feasibility stage toward the development of the technical infrastructure required for international Females in MACE evaluations.
Participating countries have contributed data for the development and testing of the system. The countries involved in the initial project include:

- Australia
- Canada
- Great Britain
- South Africa
- United States

Interbull has worked on data harmonization, quality control and the adaptation of its existing systems to accommodate female information.
The project has also involved the development and testing of the necessary data-exchange and evaluation infrastructure.
The expansion of the international Ayrshire **data set** represents an important achievement.
At the same time, the long-term value of the project will depend not only on the number of animals included, but also on the genetic diversity and geographic representation of the population.
This raises an important question for the next stage of the project: whether additional countries or populations could contribute useful information and, if so, under what conditions.

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4. The Females in MACE Approach

Traditional MACE evaluations have primarily focused on internationally evaluated sires and the exchange of information between national genetic evaluation systems.
The Females in MACE initiative seeks to extend this concept by making greater use of female information, particularly genomic information, within the international framework.
This approach may be particularly relevant to breeds such as Ayrshire, where the number of internationally important sires and the size of national reference populations can be more limited.
The project currently considers information for five principal traits:

- Milk yield
- Fat yield
- Protein yield
- Direct longevity
- Stature

The inclusion of female information could increase the number of animals contributing to the international reference population and potentially provide a broader representation of genetic diversity within the breed.
The extent to which this approach improves evaluation accuracy will depend on the quantity and quality of the available data, the genetic relationships between populations and the methodology used by Interbull.

The females in MACE project currently carried out by Interbull is including Ayrshire females EBVs records within the existing pipeline structure of Red Dairy Cattle (RDC) international evaluation:

Participating countries have provided data, for the researched traits, from Ayrshire females (of at last of 75% Ayrshire blood) and this data has been included within the above-mentioned pipeline. In your report this is addressed as a possibility of expansion of the research (paragraph 8), while it is actually the project that is ongoing. I'm a bit afraid that the way this point is presented may create some confusions for people that are not very familiar with it.
The reasons behind this approach were twofold: 1) Make the most out of the current existing Interbull pipeline/infrastructure so to reduce the associated costs for the project and 2) A clear indication from the participating countries for the overall outcome of the project being the current official MACE evaluation for RDC expanded with females (Ayrshire in this case) data, with all effects of such inclusion (impact on international EBV/reliability) investigated and explained.
Therefore, the Females in MACE approach and related results we are going to present at the WAF meeting will be based on the MACE RDC evaluation expanded with the inclusion of Ayrshire females' data.

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5. The Canadian Contribution

The Canadian contribution represents one of the important components of the current project.
The Canadian Ayrshire population and the information available through Lactanet provide an established source of genetic and genomic information that can contribute to the international initiative.
Canada remains committed to participating constructively in the international discussion and to sharing its experience with the other participating countries.
Continued Canadian participation may therefore contribute to the development of the project as it progresses from research and development toward potential operational implementation.
At the same time, the value of the initiative will ultimately depend on collaboration among participating countries and on ensuring that the objectives and benefits of the project are understood by breeders and organizations in each country.

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6. Potential Strategic Value for the Ayrshire Breed

The potential value of the project extends beyond the development of a single international evaluation.
A larger and more diverse international reference population could potentially provide:

- Greater genetic diversity within the reference population;
- More information available for genomic evaluation;
- Broader representation of different national Ayrshire populations;
- Greater opportunities for international genetic comparison;
- A stronger basis for future international genetic initiatives;
- Increased collaboration between national Ayrshire organizations and genetic evaluation centres.

For a breed such as Ayrshire, international cooperation may be particularly valuable because no single country necessarily has sufficient population size to represent the full genetic diversity of the breed.
The longer-term opportunity could therefore be to develop an international genetic information framework that creates value for participating countries while respecting national data ownership, governance and evaluation requirements.

Such a framework should be developed collaboratively, with the priorities and requirements of each participating organization taken into consideration.

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7. Exploring Opportunities to Expand International Participation

One of the next questions for the project is whether participation could be expanded beyond the countries currently involved.

In particular, it may be worthwhile to explore with the relevant organizations in **Sweden, Finland, Denmark and Norway** whether there is interest in the Females in MACE initiative and, if so, what conditions would be required for participation.

The Nordic countries have significant experience in dairy cattle breeding, genomic selection and genetic evaluation. Their Ayrshire and related red cattle populations could potentially provide additional animals, genotypes and genetic diversity to the international reference population.

If these countries were interested in participating, their contribution could potentially strengthen the geographic and genetic representation of the international population.

However, this possibility would benefit from further technical assessment before any conclusions are drawn regarding its potential impact.

The objective at this stage would therefore be to better understand:

- The level of interest among the relevant organizations;
- The data that could potentially be made available;
- The technical requirements for participation;
- Data governance and ownership considerations;
- Potential financial and administrative implications;
- The potential value to both existing and new participants.

The Potential Role of VikingGenetics

It may also be useful to discuss with the Nordic organizations whether **VikingGenetics** could have a role in facilitating communication or coordination, should there be interest in participating.

Because genetic evaluation, genomic information and breeding activities in the Nordic region can involve cooperation across national boundaries, it may be useful to determine whether existing Nordic structures could facilitate discussions.

The objective would not be to replace national organizations or national genetic evaluation systems, but rather to determine whether existing structures could help facilitate communication and cooperation.

The appropriate role, if any, would need to be determined in consultation with the organizations concerned.

How Could WAF Explore Participation?

A collaborative approach could begin with an information-sharing and dialogue phase rather than a request for an immediate commitment.

Possible elements could include:

- **Clear information on the potential benefits and limitations** of participation;
- **Reciprocal benefits**, ensuring that participating countries can understand how they could benefit from the international information generated through the project;
- **Greater genetic and geographic representation** of the international Ayrshire population;
- **Clear data governance**, including the protection, exchange and use of national data;
- **Limited additional administrative requirements**, where existing Interbull infrastructure can be used;

- **A clear technical and financial overview**, including data requirements, potential costs, timelines and implementation considerations;
- **A phased approach**, if considered appropriate, allowing organizations to assess the project before making longer-term commitments;
- **Direct dialogue with relevant Nordic organizations and VikingGenetics**, where appropriate.

The objective would be to identify the practical conditions that could make participation technically feasible and potentially beneficial for both existing and new participants.
Any decision to participate would remain with the organizations concerned.

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8. The Existing Red Dairy Cattle Framework: An Opportunity that moves us forward.

The females in MACE project currently carried out by Interbull is including Ayrshire females EBVs records within the existing pipeline structure of Red Dairy Cattle (RDC) international evaluation:
Participating countries have provided data, for the researched traits, from Ayrshire females (of at last of 75% Ayrshire blood) and this data has been included within the above-mentioned pipeline.
The reasons behind this approach were twofold:

1) **Make the most out of the current existing Interbull pipeline/infrastructure** so to reduce the associated costs for the project.
2) **A clear indication from the participating countries for the overall outcome of the project** being the current official MACE evaluation for RDC expanded with females (Ayrshire in this case) data, with all effects of such inclusion (impact on international EBV/reliability) investigated and explained.

A. Potential to Increase the Size of the Reference Population

One of the current challenges for Ayrshire is the relatively small size of the reference population.
The Interbull study on the Ayrshire project highlights the importance of reference population size for genomic evaluation and examines how the inclusion of female data could contribute to expanding that population.
If related red breed populations were found to have sufficient genetic relationships with Ayrshire, their information could potentially provide additional:

- Genotypes;
- Genetic relationships;
- Progeny and family connections;
- Connections between national populations;
- Information for animals with limited progeny information.

This question may be particularly relevant for females, which represent an important component of the Females in MACE initiative.
However, the potential value of including other populations would need to be demonstrated through technical analysis rather than assumed in advance.

B. <u>Possible expansion of the project towards InterGenomics:</u>

Early in June 2026 Interbull met with representatives of the different participating countries, where status update and some inputs on the possible service have been addressed. During that meeting, representatives from Canada, Great Britain and USA all mentioned that they did not have an interest in extending the Females in MACE project towards a possible development of InterGenomics, as was described in the initial outline of the project. Of course, they acknowledged that the final decision on this topic would be taken by the breed societies in each country together with WAF, but it seemed like they already had quite a strong position on this

matter. Interbull would remain available to plan such development should a different position be taken at the end.

At this stage, I find it difficult to take a clear position on this decision. I do not yet have a sufficient understanding of the potential impact that this decision could have on the continuation of the project or on its overall conclusions.

In addition, Ayrshire Canada has not been provided with a clear explanation of the reasons behind the Canadian representatives' position, other than the understanding that, at this stage, they do not see any additional benefit in sharing these data.

C. Nordic Red Populations

The following Nordic populations may be particularly relevant for discussion:

- Swedish Red;
- Finnish Ayrshire and related Finnish red populations;
- Danish Red;
- Norwegian Red.

The potential benefit would not simply be to obtain additional records, but potentially to create stronger connections among international red cattle populations.

Interbull's existing Red Dairy Cattle framework may provide a useful starting point for discussing whether such connections could have technical value for future genetic evaluation initiatives.

D. Potential Impact on Genomic Evaluation

Integrating related red breed populations could potentially provide access to a greater amount of genetic information, particularly if sufficient genetic relationships exist between the populations.

Potential areas for investigation could include:

- **Genomic evaluation accuracy**, through a larger reference population and broader representation of genetic families;
- **Reliability of female evaluations**, particularly for females with limited production or progeny information;
- **Identification of genetically relevant females**, which could support selection and mating decisions;
- **Reduction of some limitations associated with a relatively small Ayrshire population**, particularly for traits where less information is available.

These potential benefits are not automatic.

They would depend on the degree of genetic relatedness between populations, data compatibility, the methodology used by Interbull and the objectives of the participating organizations.

For this reason, broader data integration should first be evaluated technically before any expectations are established regarding its impact on Ayrshire genetic evaluations.

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9. Strengthening International Collaboration

Exploring broader participation could also create opportunities for collaboration among breed organizations, genetic evaluation centres and research partners.

The potential benefits could include:

- Strengthening relationships among breed organizations and genetic evaluation partners;
- Increasing the international visibility of Ayrshire females through more comprehensive and comparable genetic information;

- Encouraging the exchange of knowledge and experience in genomic selection, population management and the identification of important genetic families;
- Creating a foundation for future international initiatives involving breeds with relatively small reference populations.

The potential participation of Sweden, Finland, Denmark and Norway could be relevant to these discussions. However, the nature and extent of any collaboration should be determined jointly with the organizations involved.

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10. Questions for Valentina Palucci and Interbull

The WAF Mid-Term Meeting provides an opportunity to discuss with Interbull what would be required to broaden participation in the Females in MACE project.

The following questions are proposed for discussion:

1.
What would be required for Sweden, Finland, Denmark and Norway to participate in the Females in MACE project at this stage?

2.
Are there specific technical, data-quality, data-governance or financial considerations that would need to be addressed before additional countries could participate?

3.
Would the addition of Nordic Ayrshire populations be expected to materially increase the size or genetic diversity of the international Ayrshire reference population?

4.
Could Interbull provide an assessment of the potential value of adding Nordic Ayrshire data to the current international dataset?

5.
Could VikingGenetics have a role in facilitating communication or coordination with the relevant Nordic organizations, should there be interest in participation?

6.
What would be the most appropriate approach for WAF when initiating discussions with the Nordic organizations: a WAF initiative, an Interbull initiative, or a joint WAF–Interbull approach?

7.
Could Interbull provide a short technical and financial information package that WAF could share with potential new participants?

These questions would allow WAF to better understand the opportunities, requirements and potential challenges associated with broader participation before considering any future steps.

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11. A Possible WAF Approach

Following discussion with Interbull, WAF may wish to consider whether a small working group, or the existing WAF genetics representatives, could facilitate initial discussions with the relevant organizations in Sweden, Finland, Denmark and Norway.

The purpose would be to:

1. Understand the current situation in each country;
2. Identify potential technical or administrative considerations;
3. Determine the level of interest in the initiative;
4. Understand what information could potentially be contributed;

5. Discuss whether VikingGenetics or other relevant organizations could have a facilitating role;
6. Identify possible next steps if there is sufficient interest.

One possible sequence could be:

WAF ↔ Interbull ↔ Nordic Organizations / VikingGenetics → Technical Assessment → Discussion of Possible Participation

This approach would allow WAF to facilitate dialogue while leaving each organization free to determine its own level of interest and involvement.

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12. Future Development – InterGenomics

The development of Females in MACE may also provide a useful foundation for considering future international genetic initiatives.

One potential longer-term direction that could be monitored is **InterGenomics**.

Before such an initiative could be considered, however, the Ayrshire breed would need a sufficiently large and representative international genomic reference population, as well as an appropriate technical and organizational framework.

For this reason, continued development of the international reference population may be an important consideration for the longer-term development of Ayrshire genetic evaluation.

The immediate focus could therefore remain on consolidating Females in MACE, learning from its implementation and exploring opportunities for broader participation.

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13. Issues for Discussion

The following three strategic areas are proposed for discussion by the WAF directors.

1. Project Implementation and Timeline

- What is the current status of Females in MACE?
- What technical work remains before potential operational implementation?
- What is the current expected timeline for the first complete international evaluation?

2. International Participation

- What opportunities exist to broaden participation?
- Would it be useful to discuss participation with organizations in Sweden, Finland, Denmark and Norway?
- What role, if any, could VikingGenetics play?
- Would a joint WAF–Interbull approach be appropriate?

3. Longer-Term Development

- What conditions would need to be considered before Ayrshire could explore an InterGenomics initiative?
- How could the current Females in MACE project contribute to that longer-term objective?
- What additional countries, data and genomic information might be required?

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14. Possible Areas of WAF Follow-Up

Following discussion at the Mid-Term Meeting, WAF may wish to consider the following possible actions:

1. **Continue supporting the development of Females in MACE** as an international initiative for the Ayrshire breed.
2. **Encourage continued participation and high-quality data contributions** from the countries already involved.

3. **Explore interest among the relevant organizations in Sweden, Finland, Denmark and Norway**, without presuming their participation.
4. **Ask Interbull to clarify the technical, financial, administrative and governance considerations** associated with potential new participants.
5. **Discuss the potential role of VikingGenetics or other relevant Nordic organizations**, where appropriate.
6. **Develop clear information for potential new participants** explaining the project, its potential benefits, requirements and limitations.
7. **Continue monitoring the potential development of InterGenomics** as a longer-term area of interest.

These actions would provide a framework for continued dialogue while allowing participating organizations to determine their own priorities and level of involvement.

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15. Proposed Resolution

The World Ayrshire Federation recognizes the potential value of the International Ayrshire Genetic Data Exchange Project and supports the continued development of Females in MACE as an initiative that may strengthen the international genetic reference population of the Ayrshire breed.

The WAF supports continued dialogue with Interbull and the participating countries regarding the development of the project and welcomes opportunities to explore broader international participation.

In this context, WAF may wish to explore, together with Interbull and the relevant organizations, whether there is interest in Sweden, Finland, Denmark and Norway in participating in the initiative, and what technical, administrative, financial and governance conditions would need to be considered.

The potential role of VikingGenetics or other relevant Nordic organizations could also be discussed, where appropriate, with the objective of identifying practical and mutually beneficial ways to facilitate dialogue and cooperation.

Any future participation or expansion would remain subject to the interest, priorities and requirements of the organizations involved.

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16. Key Strategic Question for the WAF Directors

Would the WAF directors support exploring, in collaboration with Interbull and the relevant Nordic organizations, the potential for broader participation in the Females in MACE initiative, including Sweden, Finland, Denmark and Norway, while first assessing the technical, financial, administrative and governance conditions involved?

This approach would allow WAF to better understand the opportunities and challenges before considering any future commitment, while respecting the priorities and decision-making processes of each participating organization.

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17. Conclusion

The International Ayrshire Genetic Data Exchange Project represents an opportunity to strengthen cooperation in genetic evaluation across Ayrshire populations internationally.

The development of Females in MACE provides an important framework for exploring how female genomic and genetic information can contribute to a broader international reference population.

As the project develops, it may be useful to consider how participation could evolve and whether additional countries or populations could contribute to the initiative.

In particular, discussions with the relevant organizations in Sweden, Finland, Denmark and Norway could help clarify whether there is interest in participation and what conditions would need to be considered.

The existing Interbull framework for Red Dairy Cattle also raises interesting technical questions that could be explored with Interbull and the organizations concerned. These questions should be approached carefully, recognizing that the value of broader data integration will depend on genetic relationships, data compatibility, evaluation methodology, governance and the objectives of the participating organizations.
The role of WAF in this process could be to facilitate dialogue, share information and help identify opportunities for cooperation, while respecting the priorities and decision-making processes of each country and organization.
The longer-term objective is not to impose a particular structure, but to explore whether greater international cooperation can create additional value for Ayrshire breeders and strengthen the genetic development of the breed.
I hope this report will help provide a better understanding of the steps completed so far as part of this important project, as well as the opportunities that may arise as we move forward.
I would also like to sincerely thank Ms. Valentina Palucci of Interbull for her work, availability, and valuable support throughout this project.

Building stronger international connections today may provide opportunities for the next generation of Ayrshire genetic evaluation.



Michel Boudreault
Ayrshire Canada

Sources

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