

Establishment of the UQ Sperm Morphology Standardisation Program

Brief history

In 2002 the Australian Cattle Veterinarians (ACV), with significant inputs from Dr Viv Perry, Geoff Fordyce and Professor Albert Barth (University Saskatchewan), established a sperm morphologist accreditation scheme to support consistent accurate assessment of bull sperm morphology. However, due to legal concerns the Australian Veterinary Association ceased support for this service in 2011. With strong support and encouragement from Peter McAuliffe staff at the UQ School of Veterinary Science commenced working on developing a new sperm morphology standardisation program. In 2015 Prof Michael McGowan and Dr John Alawneh developed a new approach to assessing the level of agreement for percent morphologically normal sperm (PMNS) determined for selected individual semen samples assessed by different morphologists. In 2015-17 the use of this approach was trialled with sperm morphologists from around Australia and New Zealand. In late 2018 UQ formally approved the establishment of the UQ Sperm Morphology Standardisation Program (UQSMSP).

Primary objective of program

The objective of the UQSMSP is to assess the level of agreement between an individual participant's assessment of sperm morphology and an overall statistically defined standard.

Outline of the program

Participation in the program by persons providing a sperm morphology service is voluntary. Participants in the program will pay an annual fee of \$500 to UQ.

Bull semen test samples will be prepared at UQ by Professor McGowan and Dr Peter McAuliffe and sent to participants. Five selected bull ejaculates will be divided into aliquots such that each participant will receive a comparable aliquot of the ejaculate from each bull. All participants will assess sperm morphology for each test sample and then email their results to Prof McGowan within two weeks of receiving the test samples. UQSMSP will provide a confidential written report to each participant morphologist within 5 weeks of receiving all test results.

A single standard for sperm morphology assessment will be used as described in the Australian Cattle Veterinarians publication *Electroejaculators, Morphology and Microscopes* (2011). Sperm will be assigned to one of the eight standardised categories with subsequent assignment into the subcategories as used in the ACV Bullcheck morphology advanced sheet. In conducting a spermogram, each defect on each abnormal sperm is recorded; that is, more than one defect may be recorded per sperm. The number of normal sperm, and the total for each abnormality category are each divided by the number of sperm counted and then multiplied by 100; these will usually sum to greater than 100%.

PMNS determined by each participant for each test sample will be compared to the overall median (and 95% confidence intervals around the median). This median value PMNS derived from the test sample assessments submitted by all participating sperm morphologists, will act as the 'gold standard'. Overall degree of agreement with the 'gold standard' for the five test samples will be determined using recognized statistical methods

that are academically defensible. Each participating morphologist will receive a report containing an easy to interpret graph (the grey zone represents variation which is in the normal expected range, the yellow zone represents substantial but acceptable variation, and the red zone represents unacceptable variation). Individual morphologists must have only two or fewer test results in the red zone to be certified with the program. If a sperm morphologist has greater than two sample results in the “red zone” he/she will be asked to examine a further round of test samples. Prior to completing this second round of testing the participant will have the option to review their first round of assessments with an expert panel for an additional fee of \$300. The expert panel will comprise of one UQ representative and one non-UQ representative. Where there are issues of disagreement in interpretation of observed abnormalities Professor Michael McGowan in consultation with Professor Albert Barth will arbitrate. If after completing the second round of testing they have not achieved the standard required for certification the morphologist will be contacted by Prof McGowan to develop a plan to achieve this.

This process of maintaining acceptable levels of agreement between participating morphologists will be supported by regular circulation of high quality photos depicting variation in appearance of recognised abnormalities, sperm artefacts and any newly recognised abnormalities to participants in the program.

All participants in the UQSMSP will be required to keep all bull semen samples submitted to them for a period of three years after initial submission from their clients. If a query arises about the subsequent fertility of a particular bull, a participant in the program can request re-evaluation of the stored sample by UQ.

There will be an annual meeting and workshop held to provide a forum for discussion and establishment of consensus agreement in interpretation of sperm morphology. These meetings will also involve practical workshop activities on sperm sample collection, preparation and sperm morphology assessment. All individuals participating in the UQSMSP in a given year will be required to attend the annual meeting and workshop.

A set of guidelines outlining necessary equipment, protocols and interpretation of findings from morphology assessments will be provided to all participants and reviewed at regular intervals.

A Certificate will be issued by the UQSMSP to those participants who:

- Participate in the annual round of sperm morphology assessments of test samples and achieve an acceptable level of agreement with the overall median for at least 3 out of 5 samples assessed.
- Attend either in person or via Skype/Zoom the annual UQSMSP meeting/workshop

The certificate will be valid for 12 months. The certificate will be able to be used by participants in their sperm morphology business communications and marketing material. The following wording should be used on sperm morphology reports and websites, “ *I am a current member of The University of Queensland’s Sperm Morphology Standardisation Program having met all the requirements of this program* (<https://veterinary-science.uq.edu.au/filething/get/14780/Outline%20of%20UQSMSP.pdf>).”

A list of certified participants in the UQSMSP will be made available to the Australian Veterinary Association's Australian Cattle Veterinarian group via a link which will be updated annually. Dairy and beef cattle farmers and advisors and cattle breed societies seeking details about the program including current membership should contact Professor Michael McGowan at m.mcgowan@uq.edu.au.

Disclaimer

An appropriate disclaimer will be prominently displayed on promotional material and information relating to the program. Draft wording is as follows:

'The objective of the UQSMSP is to assess the level of agreement between an individual participant's assessment of sperm morphology and an overall statistically defined standard.'

The program does not attempt to certify whether any individual sperm morphologist or sperm morphologist business is suitably trained or experienced, or has appropriate equipment and methodology to provide assessment of the reproductive potential of livestock. Neither the University, nor staff involved in the program, assume any liability for any losses, costs, or expenses, including any direct, indirect, incidental, consequential, special or exemplary damages or lost profit or production, resulting from any use or misuse of information contained in reports provided by the program.'