

ESVE Veterinary Endocrinology External Quality Assessment Scheme

ESVE REPORT

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| Release Month: Jun-15 |
| Release Number: 006 |

Overall Commentary

- General** This is the report of the sixth release of the ESVE EQA scheme. The efforts made by the participants to report their results were much appreciated. We had participation from 32 separate physical locations providing 190 analytical results. The strength of a scheme such as this can only improve as more participants are recruited. If you are in contact with other laboratories that are generating veterinary endocrine analytical results that are not participants in the scheme, please encourage them to participate.
- Although the the numbers of participants within individual methodologies is still limited, we are already seeing patterns of performance that should allow participants to get a feel for how their methods compare and in some cases that are raising questions that would be best followed up by internal QC, reference range review and validation checks etc
- We continue to be cautious with the public release of method names because of the limitations of so-far having only a small participant number but as was the case on previous releases we have highlighted a small number where it seems most relevant to do so.
- This Release** This was a canine serum pool and a release of the material used in release 001. See separate Special Supplementary Report for a comparison between 001 and 006
- This release saw only 1 result excluded from statistical analyses, our lowest exclusion rate since 003. Those of you familiar with other EQA schemes will recognise that the overall CV's we are seeing are high. On this release, Thyroxine, Free T4 and TSH CV's are below 20%. A wide CV% makes more sense for our peptide representative (insulin) but it is concerning that we are seeing high CV's for the analytes that don't have species differences including very commonly measured analytes such as cortisol and fructosamine.
- For those of you that are clinicians or that work closely with clinicians, these reports serve as a reminder to exercise caution in making significant clinical management decisions based on relatively modest differences in results and particularly when basing advice to third parties on laboratory results generated at locations or by equipment over which you have no control. Theoretically at least, we should feel relatively comfortable using literature reference ranges for steroids and non-species-specific analytes but these results indicate that we should be more cautious than we might expect to need to be. In this release a cortisol of 23 or 138 nmol/L could be obtained from the same sample depending on where the result originated.
- As was the case in the previous releases and as has been the experience of the Michigan State University SCE EQUAS scheme, the range of results obtained for Oestradiol is tremendous. This is a notoriously difficult hormone to measure well which presents interpretative challenges.
- Caution** It should be remembered that assays that are more commonly used may not turn out to be the ones that yield the most accurate results so at least for now, we may have to recognise that some of the methods with the most "outlying" results may not be the methods that are "wrong".
- Please note that the Method numbers bear no relationship to one another across analytes. That is, for example, Immulite 1000, may be Method 1 for one analyte but Method 7 for another.
- A simplistic way to check for the accuracy of your reconstitution of the freeze dried sample is to check if all your "SD Multiples" are consistently positive or consistently negative.
- Cortisol** As was the case for previous releases, the range of results generated for cortisol continues to surprise especially taking into account that this is not a species specific hormone and the general consensus among endocrinologists in the interpretation of cortisol results in suppression and stimulation tests. Overall CV is just over 25%. In large human EQA schemes, CV for cortisol is 7-8%.
- Fructosamine** The range of fructosamine results is wide, the overall CV high and reference to the literature for diabetes diagnosis or monitoring cannot be recommended. That said, there is no relationship between the result reported and the upper limit of the reference ranges used for either dogs (R-sq 0.01) or cats (R-sq 0.02) suggesting comparison to local ranges and cut-off's may be equally problematic. Although there are small numbers of participants per method, one method (Method 5; Cobas) again showed a good method CV on this occasion. One possibility is that we are not capturing methodologic differences well and I propose to explore the methods used in more detail before the next release to see if that provides insight into the range of results we see.
- Insulin** As a peptide with some species differences, it is not too great a surprise to see variation in this analyte as different methods have different degrees of cross-reactivity between canine insulin and the method standards. This is an analyte where we should expect to see variation also in the reference ranges used by labs and clinicians should avoid textbook ranges (for insulin but also where appropriate insulin:glucose ratios) in reaching a diagnostic interpretation. As has been the case in previous releases and in particular 001, the Immulite methods (all 1000 in this release) yielded undetectable results.
- Progesterone** As we have achieved before, we were lucky in being able to construct a sample with a mean concentration close to the common "luteal cut-off" of 3 nmol/L. The results re-iterate the need for caution in over-interpreting results close to a "diagnostic cut-off"
- Thyroxine** The CV% achieved on this release was not quite as tight as on the original 001 release of this material but at 14% it still represents the 2nd best performance so far.

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Commentary (Continued)

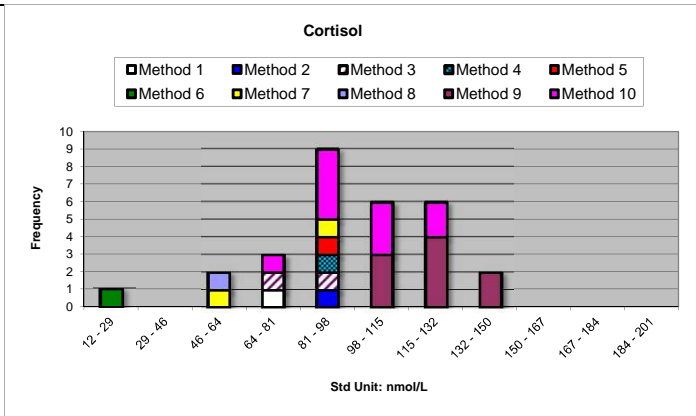
- Free T4** On a theoretical basis, the methods using dialysis or 2-step immunoseparation should yield the Free T4 results closest to the true value. Unfortunately, we have only one participant using such a method in this release (Method 1; 12.5 pmol/l). However, on this occasion, the all-method CV is a further improvement over previous releases.
- Oestradiol** The variation in results obtained for Oestradiol is a well known phenomenon to anyone participating in the MSU/SCE EQUAS scheme. Methodologic and calibration differences along with poor low-end sensitivity have been considered to play their part. Some laboratories are using extraction procedures to improve their analyses. There should be considerable caution in interpreting oestradiol results against literature ranges particularly where oestradiol is being used in isolation to support diagnoses of adrenal dysfunction. The frequency distribution of results on this occasion appears "bi-modal" which initially might suggest 2 different categories of analytic method. Intriguingly one method (Method 5) has yielded results of <5 and 304 pmol/L from 2 different locations.
- Testosterone** There was a wide variation in results which given the lack of species specificity of this hormone is surprising. As with other analytes in this scheme, it would appear that caution is required in interpreting testosterone results using literature ranges at low concentrations.
- TSH** The 3 Immulite methods yielded close agreement across laboratories with an all-Immulite CV of 7.9%.

Peter Graham, Program Coordinator, August 2015

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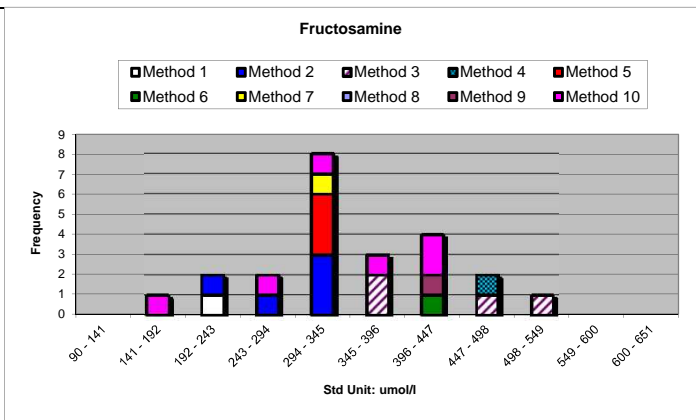
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| Cortisol | | | | |
|--------------------|-----------|-------------|--------------|-------------|
| | n | Mean | StDev | %CV |
| Method 1 | 1 | 66.2 | | |
| Method 2 | 1 | 92.1 | | |
| Method 3 | 2 | 83.2 | 16.65 | 20.0 |
| Method 4 | 1 | 80.9 | | |
| Method 5 | 1 | 84.0 | | |
| Method 6 | 1 | 23.0 | | |
| Method 7 | 2 | 77.4 | 20.87 | 27.0 |
| Method 8 | 1 | 61.8 | | |
| Method 9 | 9 | 119.3 | 10.91 | 9.1 |
| Method 10 | 10 | 100.9 | 14.80 | 14.7 |
| All Methods | 30 | 98.0 | 25.30 | 25.8 |



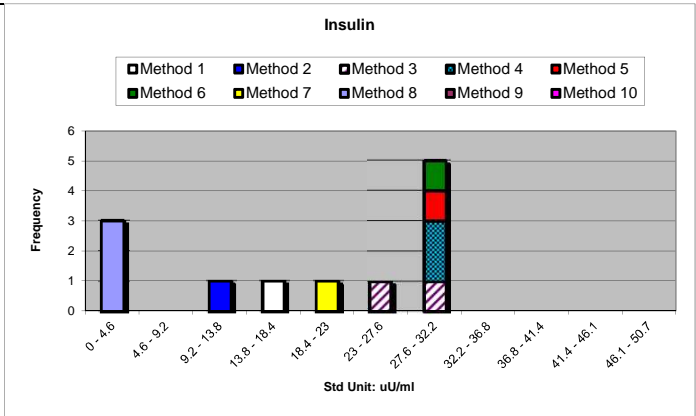
Note: Reported results ranged from 23 to 138 nmol/l.

| Fructosamine | | | | |
|---------------------|-----------|-------------|--------------|-------------|
| | n | Mean | StDev | %CV |
| Method 1 | 1 | 219 | | |
| Method 2 | 5 | 289 | 41.2 | 14.2 |
| Method 3 | 4 | 432 | 89.5 | 20.7 |
| Method 4 | 1 | 476 | | |
| Method 5 | 3 | 323 | 21.5 | 6.6 |
| Method 6 | 1 | 400 | | |
| Method 7 | 1 | 327 | | |
| Method 8 | 0 | | | |
| Method 9 | 1 | 405 | | |
| Method 10 | 6 | 327 | 92.8 | 28.4 |
| All Methods | 23 | 345 | 86.4 | 25.0 |



Note: Reported results ranged from 188 to 528 umol/L. One extreme result was excluded from statistical analysis (Method 8: 1969 umol/l)

| Insulin | | | | |
|--------------------|-----------|-------------|--------------|-------------|
| | n | Mean | StDev | %CV |
| Method 1 | 1 | 15.7 | | |
| Method 2 | 1 | 10.8 | | |
| Method 3 | 2 | 26.5 | 2.1 | 7.8 |
| Method 4 | 2 | 29.8 | 1.1 | 3.6 |
| Method 5 | 1 | 31.7 | | |
| Method 6 | 1 | 28.5 | | |
| Method 7 | 1 | 18.7 | | |
| Method 8 | 3 | 1.0 | 0.0 | 0.0 |
| Method 9 | 0 | | | |
| Method 10 | 0 | | | |
| All Methods | 12 | 18.4 | 12.24 | 66.5 |



Note: Reported results ranged from 1 to 32 uU/ml
Three results (all Method 8) were below their assay detection limit (<2) and are reported as 1 uU/ml)

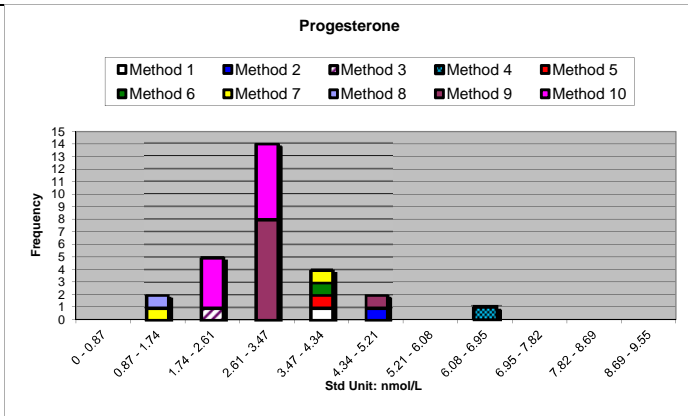
For statistical purposes, results lower than reportable limit have been converted to a value 0.5 x lowest reportable limit

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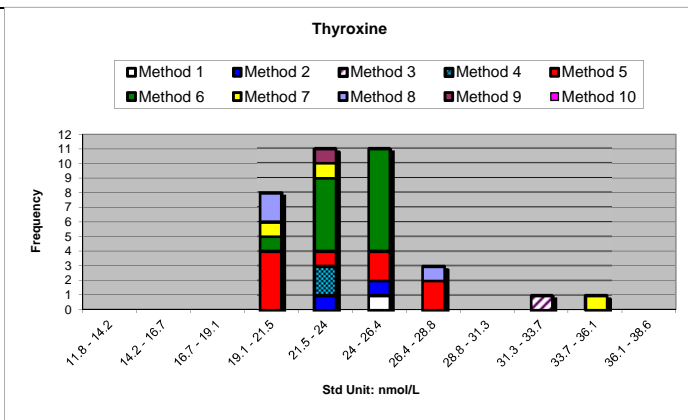
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| Progesterone | | | | |
|--------------------|-----------|-------------|-------------|-------------|
| | n | Mean | StDev | %CV |
| Method 1 | 1 | 3.88 | | |
| Method 2 | 1 | 5.14 | | |
| Method 3 | 1 | 2.10 | | |
| Method 4 | 1 | 6.84 | | |
| Method 5 | 1 | 4.28 | | |
| Method 6 | 1 | 3.70 | | |
| Method 7 | 2 | 2.67 | 2.0 | 74.1 |
| Method 8 | 1 | 1.05 | | |
| Method 9 | 9 | 3.19 | 0.7 | 22.8 |
| Method 10 | 10 | 2.61 | 0.4 | 14.8 |
| All Methods | 28 | 3.11 | 1.19 | 38.2 |



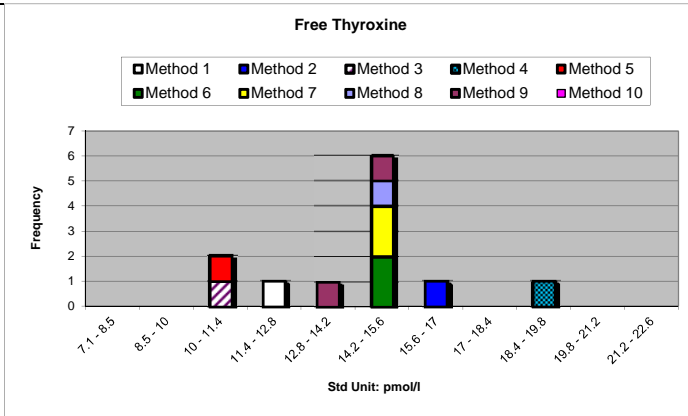
Note: Reported results ranged from 1.05 to 6.84 nmol/L

| Thyroxine | | | | |
|--------------------|-----------|--------------|--------------|-------------|
| | n | Mean | StDev | %CV |
| Method 1 | 1 | 25.10 | | |
| Method 2 | 2 | 23.34 | 2.185 | 9.4 |
| Method 3 | 1 | 32.00 | | |
| Method 4 | 2 | 22.82 | 0.309 | 1.4 |
| Method 5 | 9 | 23.24 | 2.760 | 11.9 |
| Method 6 | 13 | 23.79 | 1.918 | 8.1 |
| Method 7 | 3 | 26.65 | 8.145 | 30.6 |
| Method 8 | 3 | 22.83 | 4.744 | 20.8 |
| Method 9 | 1 | 22.29 | | |
| Method 10 | 0 | | | |
| All Methods | 35 | 24.00 | 3.390 | 14.1 |



Note: Reported results ranged from 19.8 to 36.0 nmol/L. CV% was <10% when the 2 highest results were excluded. Methods 4, 5 and 6 were "canine" methods

| Free T4 | | | | |
|--------------------|-----------|-------------|-------------|-------------|
| | n | Mean | StDev | %CV |
| Method 1 | 1 | 12.5 | | |
| Method 2 | 1 | 15.8 | | |
| Method 3 | 1 | 10.1 | | |
| Method 4 | 1 | 19.5 | | |
| Method 5 | 1 | 10.8 | | |
| Method 6 | 2 | 14.8 | 0.88 | 5.9 |
| Method 7 | 2 | 14.5 | 0.00 | 0.0 |
| Method 8 | 1 | 14.3 | | |
| Method 9 | 2 | 14.3 | 1.27 | 8.9 |
| Method 10 | 0 | | | |
| All Methods | 12 | 14.2 | 2.44 | 17.2 |



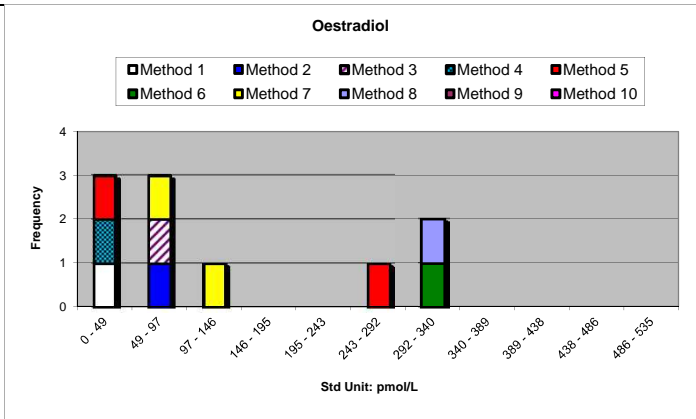
Note: Reported results ranged from 10.1 to 19.5 pmol/L. A FT4 result by equilibrium dialysis was reported by one laboratory (Method 1; 12.5 pmol/l) Methods 8 and 9 were "veterinary" methods

For statistical purposes, results lower than reportable limit have been converted to a value 0.5 x lowest reportable limit

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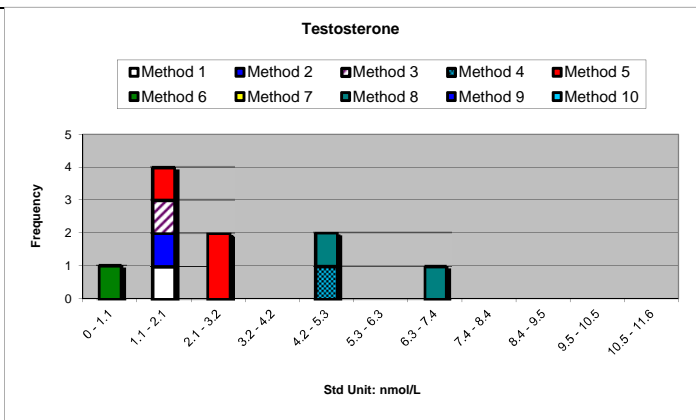
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| Oestradiol | n | Mean | StDev | %CV |
|--------------------|-----------|------------|--------------|-------------|
| Method 1 | 1 | 15.0 | | |
| Method 2 | 1 | 85.4 | | |
| Method 3 | 1 | 76.8 | | |
| Method 4 | 1 | 2.5 | | |
| Method 5 | 2 | 141.3 | 196.22 | 138.9 |
| Method 6 | 1 | 303.8 | | |
| Method 7 | 2 | 101.0 | 8.31 | 8.2 |
| Method 8 | 1 | 326.7 | | |
| Method 9 | 0 | | | |
| Method 10 | 0 | | | |
| All Methods | 10 | 129 | 126.4 | 98.0 |



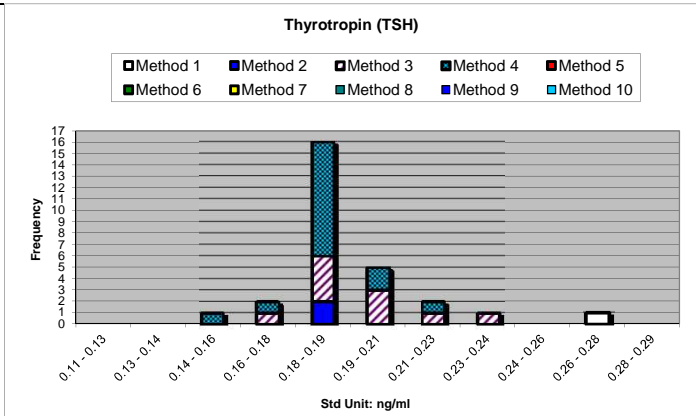
Note: Reported results ranged from <5 to 304 pmol/L.
Three results were below their method's detection limit (Method 4 and Method 5 <5; Method 1 <30 pmol/L).

| Testosterone | n | Mean | StDev | %CV |
|--------------------|-----------|------------|-------------|-------------|
| Method 1 | 1 | 2.0 | | |
| Method 2 | 1 | 1.3 | | |
| Method 3 | 1 | 1.8 | | |
| Method 4 | 1 | 4.4 | | |
| Method 5 | 3 | 2.5 | 0.60 | 23.7 |
| Method 6 | 1 | 0.0 | | |
| Method 7 | 1 | 3.5 | | |
| Method 8 | 2 | 5.7 | 1.85 | 32.3 |
| Method 9 | 0 | | | |
| Method 10 | 0 | | | |
| All Methods | 11 | 2.9 | 1.89 | 65.2 |



Note: Reported results ranged from 0.00 to 7.01 nmol/L

| TSH | n | Mean | StDev | %CV |
|--------------------|-----------|-------------|--------------|-------------|
| Method 1 | 1 | 0.27 | | |
| Method 2 | 2 | 0.18 | 0.00 | 2.7 |
| Method 3 | 10 | 0.20 | 0.02 | 8.4 |
| Method 4 | 15 | 0.19 | 0.01 | 6.4 |
| Method 5 | 0 | | | |
| Method 6 | 0 | | | |
| Method 7 | 0 | | | |
| Method 8 | 0 | | | |
| Method 9 | 0 | | | |
| Method 10 | 0 | | | |
| All Methods | 28 | 0.19 | 0.021 | 11.1 |



Note: Reported results ranged from 0.16 to 0.27 ng/ml
Methods 2, 3 and 4 represent the same manufacturer's chemiluminescent assay on 3 platforms

For statistical purposes, results lower than reportable limit have been converted to a value 0.5 x lowest reportable limit