Data Article

Dataset of endometrial blood flow from pregnant and non-pregnant mares on day 7 and 8 post-ovulation

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\textbf{A B S T R A C T}

This article provides the dataset for the use of power Doppler ultrasound to assess the equine uterus from the recent research article titled “Power Doppler can detect the presence of 7-8 days conceptuses prior to flushing in an equine embryo transfer program”\textsuperscript{(1)}. The vascularization of the endometrium was objectively assessed in mares by quantification of pixels in bitmap format (BMP) using computer assisted analysis of images. Fifty-two mares were examined on days 7 (26 mares) and 8 (26 mares) post-ovulation prior to performing flushing procedures for embryo recovery. Receiver operating characteristic (ROC) curves and Youden's J statistics were used to evaluate the value of the suggested variable in terms of its diagnostic value for identification of early pregnancy and to establish cut-off values allowing differentiation between pregnant and non-pregnant mares on days 7 and 8 post-ovulation.

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Specifications table

| Subject                          | Veterinary Medicine |
|---------------------------------|---------------------|
| Specific subject area           | Diagnostic imaging using Doppler ultrasound for early detection of pregnancy in mares |
| Type of data                    | Table               |
| How data were acquired          | Figure              |
| Data format                     | Raw Analyzed        |
| Parameters for data collection  | Fifty-two mares (Pure Bred Spanish horses), none of which showed signs of uterine pathology were used, with an age range of between 2 and 18 years old. Endometrial blood flow was evaluated, and embryo recovery was subsequently performed on days 7 and 8 post-ovulation. Mares were all sedated with romifidine (0.02 mg/kg) (Sedivet®, Barcelona, Spain), before ultrasonographic assessments were commenced. |
| Description of data collection  | Rectal ultrasound examination was performed, and the ultrasound probe was positioned transversely in the middle point of each uterine horn. Pixel quantification was used to accurately and objectively assess the degree of uterine vascular perfusion. Blind analysis was performed on a total of 208 images (four images per mare) using computer analysis with ImageJ v1.48 software (National Institute of Health, USA). Detection of blood vessels was carried out on the images with application of a color threshold which was restricted to the uterine horn under examination. |
| Data source location            | Institution: Faculty of Veterinary Medicine-University of Extremadura |
|                                 | City/Town/Region: Cáceres, Extremadura |
|                                 | Country: Spain |
| Data accessibility              | With the article |
| Related research article        | Pilar Nieto-Olmedo⁴; Francisco E Martín-Cano⁵; Gemma Gaitskell-Phillips ⁴; Jose Manuel Ortiz-Rodríguez ⁴; Fernando J Peña ⁴; Cristina Ortega-Ferrusola ⁴ Power Doppler can detect the presence of 7-8 day conceptuses prior to flushing in an equine embryo transfer program. Theriogenology 145, 1-9. https://doi.org/10.1016/j.theriogenology.2020.01.015 |

Value of the data

- These data provide useful information concerning clinical applicability of power doppler ultrasound for discrimination between pregnant and non-pregnant mares on days 7 and 8 post-ovulation before performing embryo recovery.
- These data could be beneficial in clinical practice. The technique could be used in routine clinical practice by veterinarians in order to maximize embryo recovery rates from donor mares. Cut-off values established using this data can be used to predict pregnancy diagnosis prior to embryo collection.
- In addition, these data could be useful for further research into the study of early embryonic death and the changes which occur in uterine tissues immediately prior to it.
- The data may also prove useful with regard to development of strategies for implementation of timely preventative treatments for mares which are known to have suffered from early embryonic death in the past and have been unable to maintain pregnancies.
Uterine blood flow

**Fig. 1.** This graph represents the differences in endometrial blood flow between pregnant and non-pregnant mares on days 7 and 8 post-ovulation. The results are expressed in pixels as a mean ± SD. There were significant differences detected between pregnant and non-pregnant mares (p < 0.001). Vascularization between left and right horns showed no differences in either group.

**Fig. 2.** Receiver operating characteristic (ROC) curves for the blood flow area parameter (pixels) in mares on days 7 and 8 post-ovulation. AUC: Area under the Curve. This curve was then used to identify pregnant mares on days 7 and 8 post-ovulation. When analyzed using Youden's test, data showed that the uterine blood flow area in pregnant mares was greater than 1134 pixels on day 7 with a sensitivity of 69.1% and a specificity of 94.4% and an AUC: 0.836. After analysis, the cut-off value for pregnant mares on day 8 post-ovulation was 912 pixels, with a sensitivity of 86.8% and a specificity of 100% (AUC: 0.96). Consequently, evaluation of endometrial blood flow in pixels presented a greater predictive value on day 8 post-ovulation.

- These data can be used as a basis for the development of further experiments into the changes which occur to uterine blood flow after entry of the equine embryo into the uterus which could lead to further development of the technique as a diagnostic complement for early pregnancy diagnosis with future potential to avoid unnecessary flushing procedures in non-pregnant mares.
- Both the raw and analyzed data in pixels are presented in this article. These data could be exploited in order to train veterinarians who wish to learn how to perform the technique and
Table 1
Descriptive statistics of endometrial blood flow in non-pregnant and pregnant mares expressed in pixels. Mean, standard
deviation (SD), maximum, minimum and range.

|                  | Non-pregnant mares | Pregnant mares |
|------------------|---------------------|----------------|
|                  | Mean    | SD       | Minimum | Maximum | Range   | Mean    | SD       | Minimum | Maximum | Range   |
| **Day 7**        |         |          |         |         |         |         |          |         |         |         |
|                  | 727.67  | 260.32   | 250     | 1338    | 1088    | 1389.57 | 589.07   | 313     | 2819    | 2506    |
| **Day 8**        | 508.36  | 220.35   | 119     | 904     | 785     | 1796.60 | 836.74   | 144     | 3998    | 3854    |

Table 2
Raw data file of uterine blood flow in non-pregnant mares on day 7. Nine barren mares were evaluated and 36 images
(four images per mare) were assessed in the study. Pixel quantification was used to assess the degree of uterine vascular
perfusion. The table shows the number of mares, the age of the mare, the uterine horn which was assessed and the
respective value for blood flow in pixels. The mean, standard deviation (SD) and co-efficient of variation (CV) (%) between
the two measurements from each uterine horn are also shown in the table.

| Uterine Blood flow non-pregnant mare (Day 7) | N° of mare | Age | Uterine horn | Blood flow pixel | Mean   | SD | CV (%) |
|---------------------------------------------|------------|-----|--------------|------------------|--------|----|--------|
|                                             | 3          | 4   | LEFT         | 400              | 455.00 | 77.78 | 17.09  |
|                                             |            |     | LEFT         | 510              | 388.50 | 195.87 | 50.42  |
|                                             |            |     | RIGHT        | 250              | 817.00 | 216.37 | 26.48  |
|                                             |            |     | RIGHT        | 527              | 904    | 3998  |        |
|                                             | 21         | 4   | LEFT         | 448              | 362.00 | 121.62 | 33.60  |
|                                             |            |     | LEFT         | 276              | 889    | 598.00 | 68.82  |
|                                             |            |     | RIGHT        | 970              | 988.00 | 65.05  | 5.73   |
|                                             |            |     | RIGHT        | 664              | 1028   | 673.00 | 9.67   |
|                                             | 26         | 5   | LEFT         | 466              | 598.00 | 411.54 | 68.82  |
|                                             |            |     | LEFT         | 828              | 627    | 65.05  | 9.67   |
|                                             |            |     | RIGHT        | 948              | 673.00 | 65.05  | 9.67   |
|                                             |            |     | RIGHT        | 1028             | 719    | 65.05  | 9.67   |
|                                             | 29         | 2   | LEFT         | 662              | 602.00 | 84.85  | 14.10  |
|                                             |            |     | LEFT         | 542              | 588.50 | 62.93  | 10.69  |
|                                             |            |     | RIGHT        | 544              | 598.00 | 62.93  | 10.69  |
|                                             |            |     | RIGHT        | 633              | 673.00 | 65.05  | 9.67   |
|                                             | 45         | 10  | LEFT         | 786              | 701.00 | 120.21 | 17.15  |
|                                             |            |     | LEFT         | 616              | 903.50 | 299.11 | 33.11  |
|                                             |            |     | RIGHT        | 1115             | 903.50 | 299.11 | 33.11  |
|                                             |            |     | RIGHT        | 692              | 719    | 65.05  | 9.67   |
|                                             | 47         | 11  | LEFT         | 993              | 1050.00| 80.61  | 7.68   |
|                                             |            |     | LEFT         | 1107             | 1278.00| 84.85  | 6.64   |
|                                             |            |     | RIGHT        | 1218             | 864.00 | 70.71  | 8.18   |
|                                             |            |     | RIGHT        | 1338             | 864.00 | 70.71  | 8.18   |
|                                             | 49         | 11  | LEFT         | 814              | 864.00 | 70.71  | 8.18   |
|                                             |            |     | LEFT         | 914              | 864.00 | 70.71  | 8.18   |
|                                             |            |     | RIGHT        | 865              | 829.00 | 50.91  | 6.14   |
|                                             |            |     | RIGHT        | 793              | 829.00 | 50.91  | 6.14   |
|                                             | 51         | 9   | LEFT         | 640              | 613.50 | 37.48  | 6.11   |
|                                             |            |     | LEFT         | 587              | 740.00 | 65.05  | 8.79   |
|                                             |            |     | RIGHT        | 786              |        |        |        |

used as a reference to ensure they are performing the procedure correctly. The raw data highlights the extent of variation that can be expected from measurements of uterine blood flow via Doppler images.
Table 3
Raw data file of uterine blood flow in pregnant mares on day 7.
Seventeen pregnant mares (positive flushing) were assessed and 68 images (four images per mare) were evaluated in the experiment. Pixel quantification was used to assess the degree of uterine vascular perfusion. The table shows the number of mares, the age of each mare, the uterine horn assessed and the values for blood flow in pixels. The mean, standard deviation (SD) and co-efficients of variation (CV) (%) between the two measurements from each uterine horn are also shown in the table.

| N° of mare | Age | Uterine horn | Blood flow pixel | Mean   | SD       | CV (%) |
|-----------|-----|-------------|-----------------|--------|----------|--------|
| 1         | 18  | LEFT        | 1814            | 1656,50| 222,74   | 13,45  |
|           |     | LEFT        | 1499            |        |          |        |
|           |     | RIGHT       | 2618            | 2143,50| 671,04   | 31,31  |
|           |     | RIGHT       | 1669            |        |          |        |
| 4         | 6   | LEFT        | 468             | 626,50 | 224,15   | 35,78  |
|           |     | LEFT        | 785             |        |          |        |
|           |     | RIGHT       | 949             | 850,50 | 139,30   | 16,38  |
|           |     | RIGHT       | 752             |        |          |        |
| 5         | 11  | LEFT        | 1454            | 1447,50| 9,19     | 0,64   |
|           |     | LEFT        | 1441            |        |          |        |
|           |     | RIGHT       | 1204            | 1481,50| 392,44   | 26,49  |
|           |     | RIGHT       | 1759            |        |          |        |
| 6         | 11  | LEFT        | 1853            | 1760,50| 130,81   | 7,49   |
|           |     | LEFT        | 1668            |        |          |        |
|           |     | RIGHT       | 1258            | 1607,00| 493,56   | 28,49  |
|           |     | RIGHT       | 1956            |        |          |        |
| 9         | 9   | LEFT        | 2012            | 2057,00| 63,64    | 3,09   |
|           |     | LEFT        | 2102            |        |          |        |
|           |     | RIGHT       | 1578            | 1409,50| 238,29   | 16,91  |
|           |     | RIGHT       | 1241            |        |          |        |
| 11        | 7   | LEFT        | 1182            | 1631,50| 635,69   | 38,96  |
|           |     | LEFT        | 2081            |        |          |        |
|           |     | RIGHT       | 1242            | 1476,00| 330,93   | 22,42  |
|           |     | RIGHT       | 1710            |        |          |        |
| 15        | 8   | LEFT        | 1941            | 1936,50| 6,36     | 0,33   |
|           |     | LEFT        | 1932            |        |          |        |
|           |     | RIGHT       | 1982            | 2258,00| 390,32   | 17,29  |
|           |     | RIGHT       | 2534            |        |          |        |
| 16        | 7   | LEFT        | 1912            | 1532,50| 536,69   | 35,02  |
|           |     | LEFT        | 1153            |        |          |        |
|           |     | RIGHT       | 1307            | 1568,00| 369,11   | 23,54  |
|           |     | RIGHT       | 1829            |        |          |        |
| 20        | 7   | LEFT        | 2624            | 2103,00| 736,81   | 35,04  |
|           |     | LEFT        | 1582            |        |          |        |
|           |     | RIGHT       | 1900            | 1679,50| 311,83   | 18,57  |
|           |     | RIGHT       | 1459            |        |          |        |
| 22        | 6   | LEFT        | 1799            | 1296,50| 710,64   | 54,81  |
|           |     | LEFT        | 794             |        |          |        |
|           |     | RIGHT       | 1391            | 945,00 | 630,74   | 66,74  |
|           |     | RIGHT       | 499             |        |          |        |
| 24        | 5   | LEFT        | 1258            | 1291,50| 47,38    | 3,67   |
|           |     | LEFT        | 1325            |        |          |        |
|           |     | RIGHT       | 776             | 859,00 | 117,38   | 13,66  |
|           |     | RIGHT       | 942             |        |          |        |
| 25        | 5   | LEFT        | 1478            | 1455,50| 31,82    | 2,19   |
|           |     | LEFT        | 1433            |        |          |        |
|           |     | RIGHT       | 858             | 1387,00| 748,12   | 53,94  |
|           |     | RIGHT       | 1916            |        |          |        |
| 33        | 3   | LEFT        | 746             | 1365,00| 875,40   | 64,13  |
|           |     | LEFT        | 1984            |        |          |        |
|           |     | RIGHT       | 903             | 778,00 | 176,78   | 22,72  |
|           |     | RIGHT       | 653             |        |          |        |
| 34        | 2   | LEFT        | 1412            | 1289,00| 173,95   | 13,49  |

(continued on next page)
Table 3 (continued)

| Uterine Blood flow pregnant mare (Day 7) | N° of mare | Age | Uterine horn | Blood flow pixel | Mean  | SD   | CV (%) |
|------------------------------------------|------------|-----|--------------|------------------|-------|------|--------|
|                                          | 35         | 2   | LEFT         | 1166             | 1482,00 | 113,14 | 7,63    |
|                                          |            |     | RIGHT        | 1402             |        |      |        |
|                                          |            |     | RIGHT        | 1562             |        |      |        |
|                                          | 36         | 2   | LEFT         | 494              | 403,50  | 127,99 | 31,72   |
|                                          |            |     | LEFT         | 313              |        |      |        |
|                                          |            |     | RIGHT        | 655              | 827,50  | 243,95 | 29,48   |
|                                          |            |     | RIGHT        | 1000             |        |      |        |
|                                          | 41         | 6   | LEFT         | 727              | 611,50  | 163,34 | 26,71   |
|                                          |            |     | LEFT         | 496              |        |      |        |
|                                          |            |     | RIGHT        | 820              | 645,00  | 247,49 | 38,37   |
|                                          |            |     | RIGHT        | 470              |        |      |        |
|                                          |            |     | LEFT         | 2045             | 1611,50 | 613,06 | 38,04   |
|                                          |            |     | LEFT         | 1178             |        |      |        |
|                                          |            |     | RIGHT        | 1326             | 1062,50 | 372,65 | 35,07   |

1. Data Description

This dataset provides a complete set of measurements from images showing blood flow to the equine uterus in the mare at 7 and 8 days post-ovulation which were obtained using power Doppler ultrasound. Quantification of pixels was used to objectively assess each image whilst in bitmap format (BMP) aided by computer assisted image analysis.

The dataset is shown in the following tables and figures:

Figs. 1 and 2.
Tables 1-5

2. Experimental Design, Materials, and Methods

The aim of this experiment was to assess whether evaluation of endometrial blood flow in mares could be rated as a good tool for identification of early pregnancy. In total, fifty-two mares of a range of different ages (2-18 years old) were used to obtain this data. Ultrasonographic examination with Power Doppler was used to assess uterine blood flow prior to uterine flushing procedures for embryo recovery on both days 7 and 8 after ovulation. Two transverse images were captured per uterine horn and analysis of images was subsequently performed at a later date using Image J 1.48 software.

Prior to ultrasonographic examination all mares were sedated with romifidine (0.02 mg/kg) (Sedivet® Boehringer Ingelheim, Barcelona, España). MyLabFive Vet equipment (Esaote S.p.A, Genova, Italy) with a linear 5-7.5 MHz probe was used to complete the assessment. The specific settings used were: gain: 70%, PRF: 1.4 KHz at a depth of 9 cm. Examination was performed per rectum and the ultrasound probe was placed transversely at a mid-point of both uterine horns in order to capture two still images per horn. Signals indicating blood flow in all the endometrial, myometrial and perimetrial vessels were visualized using Power flow modes due to their capacity for greater sensitivity for detection of weak signals from small vessels. Degree of uterine vascular perfusion was objectively assessed using quantification of pixels in bitmap (BMP) format. Blind analysis was performed on a total of 208 images (four images per mare). Subsequent computer analysis of Doppler images was executed using ImageJ v1.48 software (National Institute of Health, USA). User-defined selections and intensity-thresholded objects can be analyzed with ImageJ, which is a Java-based image processing program. Analysis of endometrial vascular perfusion was performed using spot meter techniques, measuring blood flow area. A color
Table 4
Raw data file showing uterine blood flow in non-pregnant mares on day 8. Nine barren mares were evaluated and 36 images (four images per mare) were assessed in the study. Pixel quantification was used to assess the degree of uterine vascular perfusion. The table shows the number of mares, the age of each mare, the uterine horn assessed and the values for blood flow in pixels. The mean, standard deviation (SD) and co-efficients of variation (CV) (%) between the two measurements from each uterine horn are also shown in the table.

| Uterine Blood flow non-pregnant mare (Day 8) | Blood flow pixel | Mean  | SD     | CV (%) |
|---------------------------------------------|------------------|-------|--------|--------|
| N° of mare                                  | Age              |       |        |        |
| 2                                           | 6                | LEFT  | 140    | 152,50 | 17,68  | 11,59 |
|                                             |                  | LEFT  | 165    |        |        |        |
|                                             |                  | RIGHT | 510    | 325,00 | 261,63 | 80,50 |
|                                             |                  | RIGHT | 140    |        |        |        |
| 17                                          | 7                | LEFT  | 292    | 328,00 | 50,91  | 15,52 |
|                                             |                  | LEFT  | 284    | 337,00 | 74,95  | 22,24 |
|                                             |                  | RIGHT | 284    |        |        |        |
|                                             |                  | RIGHT | 305    |        |        |        |
| 38                                          | 3                | LEFT  | 595    | 536,50 | 82,73  | 15,42 |
|                                             |                  | LEFT  | 478    |        |        |        |
|                                             |                  | RIGHT | 369    | 337,00 | 45,25  | 13,43 |
|                                             |                  | RIGHT | 305    |        |        |        |
| 40                                          | 3                | LEFT  | 563    | 341,00 | 313,96 | 92,07 |
|                                             |                  | LEFT  | 119    |        |        |        |
|                                             |                  | RIGHT | 317    | 323,00 | 8,49   | 2,63  |
|                                             |                  | RIGHT | 329    |        |        |        |
| 43                                          | 3                | LEFT  | 490    | 440,50 | 70,00  | 15,89 |
|                                             |                  | LEFT  | 391    |        |        |        |
|                                             |                  | RIGHT | 427    | 398,00 | 41,01  | 10,30 |
|                                             |                  | RIGHT | 369    |        |        |        |
| 46                                          | 10               | LEFT  | 686    | 713,00 | 38,18  | 5,36  |
|                                             |                  | LEFT  | 740    |        |        |        |
|                                             |                  | RIGHT | 614    | 647,00 | 46,67  | 7,21  |
|                                             |                  | RIGHT | 680    |        |        |        |
| 48                                          | 11               | LEFT  | 889    | 783,50 | 149,20 | 19,04 |
|                                             |                  | LEFT  | 678    |        |        |        |
|                                             |                  | RIGHT | 904    | 728,50 | 248,19 | 34,07 |
|                                             |                  | RIGHT | 553    |        |        |        |
| 50                                          | 11               | LEFT  | 729    | 699,50 | 41,72  | 5,96  |
|                                             |                  | LEFT  | 670    |        |        |        |
|                                             |                  | RIGHT | 473    | 673,50 | 283,55 | 42,10 |
|                                             |                  | RIGHT | 874    |        |        |        |
| 52                                          | 9                | LEFT  | 544    | 670,00 | 178,19 | 26,60 |
|                                             |                  | LEFT  | 796    |        |        |        |
|                                             |                  | RIGHT | 660    |        |        |        |
|                                             |                  | RIGHT | 774    |        |        |        |

Table 5
Raw data file showing uterine blood flow in pregnant mares on day 8. Seventeen pregnant mares (positive flushings) were assessed and 68 images (four images per mare) were evaluated in the study. Pixel quantification was used to assess the degree of uterine vascular perfusion. The table shows the number of mares, the age of each mare, the uterine horn assessed and the values for blood flow in pixels. The mean, standard deviation (SD) and co-efficients of variation (CV) (%) between the two measurements from each uterine horn are also shown in the table.

| Uterine Blood flow non-pregnant mare (Day 8) | Blood flow pixel | Mean  | SD     | CV (%) |
|---------------------------------------------|------------------|-------|--------|--------|
| N° of mare                                  | Age              |       |        |        |
| 2                                           | 6                | LEFT  | 140    | 152,50 | 17,68  | 11,59 |
|                                             |                  | LEFT  | 165    |        |        |        |
|                                             |                  | RIGHT | 510    | 325,00 | 261,63 | 80,50 |
|                                             |                  | RIGHT | 140    |        |        |        |
| 17                                          | 7                | LEFT  | 292    | 328,00 | 50,91  | 15,52 |
|                                             |                  | LEFT  | 364    |        |        |        |

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Table 5 (continued)

| Uterine Blood flow non-pregnant mare (Day 8) | Blood flow pixel | Mean | SD  | CV (%) |
|---------------------------------------------|------------------|------|-----|--------|
| N° of mare | Age | Uterine horn |                  |      |       |      |
| 38      | 3   | RIGHT       | 284   | 337.00 | 74.95 | 22.24 |
|         |     | RIGHT       | 390   |         |       |       |
|         |     | LEFT        | 595   | 536.50  | 82.73 | 15.42 |
|         |     | LEFT        | 478   |         |       |       |
|         |     | RIGHT       | 369   | 337.00  | 45.25 | 13.43 |
|         |     | RIGHT       | 305   |         |       |       |
| 40      | 3   | LEFT        | 563   | 341.00  | 313.96 | 92.07 |
|         |     | LEFT        | 119   | 8.49    | 2.63  |       |
|         |     | RIGHT       | 390   | 323.00  | 8.49  | 2.63  |
|         |     | RIGHT       | 329   |         |       |       |
| 43      | 3   | LEFT        | 490   | 440.50  | 70.00 | 15.89 |
|         |     | LEFT        | 391   |         |       |       |
|         |     | RIGHT       | 427   | 398.00  | 41.01 | 10.30 |
|         |     | RIGHT       | 369   |         |       |       |
| 46      | 10  | LEFT        | 686   | 713.00  | 38.18 | 5.36  |
|         |     | LEFT        | 740   |         |       |       |
|         |     | RIGHT       | 614   | 647.00  | 46.67 | 7.21  |
|         |     | RIGHT       | 680   |         |       |       |
| 48      | 11  | LEFT        | 889   | 783.50  | 149.20 | 19.04 |
|         |     | LEFT        | 678   |         |       |       |
|         |     | RIGHT       | 904   | 728.50  | 248.19 | 34.07 |
|         |     | RIGHT       | 553   |         |       |       |
| 50      | 11  | LEFT        | 729   | 699.50  | 41.72 | 5.96  |
|         |     | LEFT        | 670   |         |       |       |
|         |     | RIGHT       | 473   | 673.50  | 283.55 | 42.10 |
|         |     | RIGHT       | 874   |         |       |       |
| 52      | 9   | LEFT        | 544   | 670.00  | 178.19 | 26.60 |
|         |     | LEFT        | 796   |         |       |       |
|         |     | RIGHT       | 660   | 717.00  | 80.61 | 11.24 |
|         |     | RIGHT       | 774   |         |       |       |

Threshold restricted to the uterine horn in question was applied first for blood vessel detection. Following this, the total area for the region of interest (blood vessels) was calculated.

Uncited references

[1]

Author Contribution Section

PNO: Conceptualization, conceived the study and performed experiments, methodology and data curation; FEMC: performed the analysis of data with Image J (Software), validation and reviewed the draft. GGP: data curation and English review (native speaker) writing - review & editing. JMO: Methodology, data curation. FJP: Conceptualization, funding acquisition, English review and statistical analysis. COF: Conceptualization, conceived the study, supervision, formal analysis and roles/writing - original draft.

Competing Interests

The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.
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