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# Data Article

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



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# ABSTRACT

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"(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
	Figure
How data were acquired	Ultrasonographic examination was performed using MyLabFive Vet equipment (Esaote S.p.A, Genova, Italy) and a linear 5–7.5 MHz probe. Rectal ultrasound examination was performed and the ultrasound probe was positioned transversely in the middle point of each uterine horn. Two still images were obtained per horn from the ultrasound examination. Signals for blood flow in all endometrial, myometrial and perimetrial vessels were visualized using Power flow modes and blood flow was measured in pixels. Still Doppler images were assessed using computer analysis with ImageJ v1.48 software (National Institute of Health, USA). ImageJ is a Java-based image processing program which is capable of calculating pixel value statistics for user-defined selections.
Data format	Raw
butu format	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 Related research article	With the article Pilar Nieto-Olmedo <sup>a</sup> ; Francisco E Martín-Cano <sup>b</sup> ; Gemma Gaitskell-Phillips <sup>a</sup> ; Jose Manuel Ortiz-Rodríguez <sup>a</sup> ; Fernando J Peña <sup>a</sup> ; Cristina Ortega-Ferrusola <sup>a</sup> 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  $\pm$  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	Maximun	Range
Day 7 Day 8	727,67 508,36	260,32 220,35	250 119	1338 904	1088 785	1389,57 1796,60	589,07 836,74	313 144	2819 3998	2506 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)								
$N^\circ$ of mare	Age	Uterine horn	Blood flow pixel	Mean	SD	CV (%)		
3	4	LEFT	400	455,00	77,78	17,09		
		LEFT	510					
		RIGHT	250	388,50	195,87	50,42		
		RIGHT	527					
21	4	LEFT	448	362,00	121,62	33,60		
		LEFT	276					
		RIGHT	970	817,00	216,37	26,48		
		RIGHT	664					
23	6	LEFT	466	647,00	255,97	39,56		
		LEFT	828					
		RIGHT	948	988,00	56,57	5,73		
		RIGHT	1028					
26	5	LEFT	307	598,00	411,54	68,82		
		LEFT	889					
		RIGHT	627	673,00	65,05	9,67		
		RIGHT	719					
29	2	LEFT	662	602,00	84,85	14,10		
		LEFT	542					
		RIGHT	544	588,50	62,93	10,69		
		RIGHT	633					
45	10	LEFT	786	701,00	120,21	17,15		
		LEFT	616					
		RIGHT	1115	903,50	299,11	33,11		
		RIGHT	692					
47	11	LEFT	993	1050,00	80,61	7,68		
		LEFT	1107					
		RIGHT	1218	1278,00	84,85	6,64		
10		RIGHT	1338					
49	11	LEFT	814	864,00	70,71	8,18		
		LEFT	914					
		RIGHT	865	829,00	50,91	6,14		
		RIGHT	793					
51	9	LEFT	640	613,50	37,48	6,11		
		LEFT	587	740.00	65 05	0.70		
		KIGHI	/80	740,00	65,05	8,79		
		KIGHI	694					

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.

Uterine Blood flow pregnant mare (Day 7)								
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	27,49		
		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	1/10					
15	8	LEFT	1941	1936,50	6,36	0,33		
		LEFT	1932	2250.00	200.22	47.00		
		RIGHT	1982	2258,00	390,32	17,29		
10	-	RIGHI	2534	1500 50	500.00	25.00		
16	/	LEFI	1912	1532,50	536,69	35,02		
		LEFI	1153	1500.00	200.11	00.54		
		RIGHT	1307	1568,00	369,11	23,54		
20	7	KIGHI	1829	2102.00	700.01	25.04		
20	/	LEFI	2624	2103,00	/36,81	35,04		
		LEFI	1000	1070 50	211.02	10 57		
		RIGHT	1900	1679,50	311,83	18,57		
22	C	KIGHI	1459	1200 50	710.04	F 4 01		
22	0	LEFI	1/99	1296,50	/10,64	54,81		
			1201	045.00	620 74	66 74		
			1591	945,00	030,74	00,74		
24	5	IGT	499	1201 50	1720	2.67		
24	5	LEFT	1235	1291,30	47,56	3,07		
		DICUT	776	850.00	117 20	12.66		
		DICUT	042	839,00	117,56	15,00		
25	5	LEET	1/78	1455 50	31.82	2 10		
23	5	LEIT	1470	1433,30	51,62	2,15		
		RICHT	858	1387.00	7/18 12	53.04		
		RICHT	1016	1387,00	740,12	55,54		
33	3	LEFT	746	1365.00	875 40	64 13		
		LEFT	1984	1303,00	075,40	U-1,1J		
		RIGHT	903	778.00	176 78	<u> </u>		
		RICHT	653	770,00	170,70	22,12		
34	2	LEFT	1412	1289.00	173 95	13 49		
7	2		1712	1203,00	113,33	13,43		

(continued on next page)

Uterine Blood fl N° of mare	ow pregnan Age	t mare (Day 7) Uterine horn	Blood flow pixel	Mean	SD	CV (%)
		LEFT	1166			
		RIGHT	1402	1482,00	113,14	7,63
		RIGHT	1562			
35	2	LEFT	494	403,50	127,99	31,72
		LEFT	313			
		RIGHT	655	827,50	243,95	29,48
		RIGHT	1000			
36	2	LEFT	727	611,50	163,34	26,71
		LEFT	496			
		RIGHT	820	645,00	247,49	38,37
		RIGHT	470			
41	6	LEFT	2045	1611,50	613,06	38,04
		LEFT	1178			
		RIGHT	1326	1062,50	372,65	35,07
		RIGHT	799			

#### Table 3 (continued)

#### 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 N° of mare	v non-pregna Age	ant mare (Day 8) Uterine horn	Blood flow pixel	Mean	SD	CV (%)
2	6	IFET	140	152.50	1769	11 50
2	0	LEFT	165	152,50	17,00	11,35
		RICHT	510	325.00	261.63	80.50
		RICHT	140	525,00	201,05	80,50
17	7	LEET	292	328.00	50.91	15 52
17	,	LEFT	364	520,00	50,51	15,52
		RIGHT	284	337.00	74 95	22.24
		RIGHT	390	337,00	71,55	22,21
38	3	LEFT	595	536 50	82 73	15 42
50	5	LEFT	478	550,50	02,75	13,12
		RIGHT	369	337.00	45.25	13 43
		RIGHT	305	33,100	10,20	10,10
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	717,00	80,61	11,24
		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)									
$N^\circ$ of mare	Age	Uterine horn	Blood flow pixel	Mean	SD	CV (%)			
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						

(continued on next page)

N° of mare         Age         Uterine horn         Blood flow pixel         Mean         SD         CV (%)           38         RIGHT         284         337,00         74,95         22,24           38         LEFT         595         565,00         82,73         15,42           LEFT         478         100         45,25         13,43           40         3         LEFT         563         341,00         313,96         92,07           LEFT         109         107         119         119         119         119           43         3         LEFT         119         110         15,89           46         10         LEFT         490         440,50         70,00         15,89           46         10         LEFT         391         10,30         10,30         10,30         10,30         10,30         10,30         10,30         10,31,30         10,3	Uterine Blood flow non-pregnant mare (Day 8)						
38         3         RICHT RICHT         284         337,00         74,95         22,24           38         3         LEFT         595         536,50         82,73         15,42           LEFT         478         78         74,95         15,42           40         3         LEFT         669         337,00         45,25         13,43           40         3         LEFT         563         341,00         313,96         92,07           LEFT         19         70         313,96         92,07         167         167           43         3         LEFT         563         341,00         313,96         92,07           443         3         LEFT         90         440,50         70,00         15,89           243         A         LEFT         490         440,50         70,00         15,89           244         A         LEFT         490         440,50         70,00         16,93           46         10         LEFT         686         713,00         38,18         5,36           47         LEFT         686         713,00         38,18         5,36           12         LEFT	$N^{\circ}$ of mare	Age	Uterine horn	Blood flow pixel	Mean	SD	CV (%)
RIGHT         990           28         1 LEFT         595         58.50         82.73         14.14           LEFT         478         337,00         45.25         13.43           RIGHT         369         337,00         45.25         13.43           A0         3         11         369         31.90         12.14           A0         3         12.14         369         31.90         45.25         13.43           A0         A         12.14         305         31.396         2.63         31.96         2.63           A0         A         12.14         317         323,00         8.49         2.63           A1         LEFT         131         323,00         8.49         2.63           A1         LEFT         391         440.50         70.00         16.14           A1         12.14         398.00         41.01         10.30         16.14           A1         12.14         12.14         12.14         12.14         12.14           A1         12.14         740         72.14         12.14         12.14           A2         12.14         614         647.00         14.9.20			RIGHT	284	337,00	74,95	22,24
38         3         LEFT LEFT         595         536,50         82,73         15,42           478         397,00         45,253         13,43           8064         305         313,96         92,07           40         3         LEFT         563         341,00         313,96         92,07           40         3         LEFT         563         341,00         8,49         2,63           40         RIGHT         317         323,00         8,49         2,63           43         LEFT         490         440,50         70,00         15,89           LEFT         391         10         10,30         15,89           LEFT         391         10,30         38,18         5,36           LEFT         686         713,00         38,18         5,36           46         LEFT         740         10,00         10,01         10,01           LEFT         686         733,00         149,20         19,04         10,02         19,04           LEFT         670         10         LEFT         670         10         12,12         10,01         10,01         10,01         10,01         10,01			RIGHT	390			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	38	3	LEFT	595	536,50	82,73	15,42
RIGHT         369         337,00         45,25         13,43           40         3         LEFT         563         341,00         313,96         92,07           LEFT         119         119         119         119         119         119         119         119           43         3         LEFT         490         440,50         8,49         2,63           443         3         LEFT         490         440,50         70,00         15,89           16HT         391         398,00         41,01         10,30         10,30           16HT         369         10,30         10,31,30         38,18         5,36           16HT         686         713,00         38,18         5,36           16HT         680         713,00         38,18         5,36           16HT         680         713,00         46,67         7,21           16HT         680         149,20         19,04         19,04           16HT         690         78,50         149,20         19,04           16HT         53         670         12         14,01           16HT         729         69,50         41,72 <td></td> <td></td> <td>LEFT</td> <td>478</td> <td></td> <td></td> <td></td>			LEFT	478			
40       3       ILFT       563       31,00       313,96       92,07         41       119       119       223,00       8,49       2,63         43       3       ILFT       329       305       305       305         43       3       ILFT       329       305       305       305         43       3       ILFT       329       305       305       305         44       3       305       100       10,00       10,00       10,00         46       10       ILFT       686       713,00       38,18       5,36         10       ILFT       740       740       740       740       740       740         48       11       ILFT       686       713,00       38,18       5,36         11       ILFT       670       740       740       740       740       740         11       ILFT       670       740<			RIGHT	369	337,00	45,25	13,43
40       3       LEFT       563       341,00       313,96       92,07         LEFT       119       323,00       8,49       2,63         RIGHT       329       323,00       8,49       2,63         43       3       LEFT       490       440,50       70,00       15,89         43       3       LEFT       391       10,30       10,30         46       10       LEFT       686       713,00       38,18       5,36         46       10       LEFT       740       10,30       10,30       10,30         47       10       RIGHT       614       647,00       46,677       721,00         48       11       LEFT       678       149,20       19,04         11       LEFT       678       149,20       149,20       19,04         11       LEFT       678       149,20       149,20       19,04         12       RIGHT       729       699,50			RIGHT	305			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	40	3	LEFT	563	341,00	313,96	92,07
RIGHT RIGHT         317 329         323,00         8,49         2,63           43         3         LEFT         490         440,50         70,00         15,89           LEFT         391         391         10,30         10,30         10,30           46         10         LEFT         686         713,00         38,18         5,36           47         10         LEFT         686         713,00         38,18         5,36           46         10         LEFT         680         783,50         46,67         7,21           48         11         LEFT         680         783,50         149,20         19,04           10         LEFT         670         10,00         14,12         5,96           11         LEFT         670         11         12,12         14,12         5,96           11         LEFT         670         11         12,12         14,12         14,12         14,12         14,12           52         9         LEFT         796         10,12         14,12         14,12           12         LEFT         796         11,24         14,12         14,12           13			LEFT	119			
A3       3       RIGHT       329         43       3       LEFT       490       440,50       70,00       15,89         LEFT       391       398,00       41,01       10,30         RIGHT       329       398,00       41,01       10,30         RIGHT       369       398,00       41,01       10,30         RIGHT       686       713,00       38,18       5,36         LEFT       740       10       10       10       10         RIGHT       614       647,00       46,67       7,21         RIGHT       614       647,00       40,67       7,21         RIGHT       614       647,00       40,67       7,21         RIGHT       670       10       10,01       10,01         RIGHT       533       10       11,02       10,01         S54       729       699,50       41,72       5,96         LEFT       670       11,02       10,01       10,01         RIGHT       874       10       10,01       10,01         S52       9       IGHT       546       670,00       178,19       26,60         LEFT       7			RIGHT	317	323,00	8,49	2,63
43       3       LEFT       490       440,50       70,00       15,89         LEFT       391       391       100       RigHT       427       398,00       41,01       10,30         46       10       LEFT       686       713,00       38,18       5,36         46       10       LEFT       740       740       741         RIGHT       614       647,00       46,67       7,21         48       11       LEFT       680       783,50       149,20       19,04         LEFT       678       782,50       248,19       34,07         RIGHT       904       553       750       740       740         50       11       LEFT       670       72,10       34,07       34,07         RIGHT       973       695,50       41,72       5,96       76,00       76,00       70,00       70,00         52       9       LEFT       776       74       74       74,00       76,00       78,19       26,60         52       9       LEFT       774       74       74,00       74,00       76,00       78,19       26,60			RIGHT	329			
LEFT       391         RIGHT       427       398,00       41,01       10,30         A6       10       LEFT       686       713,00       38,18       5,36         LEFT       686       713,00       38,18       5,36         RIGHT       614       647,00       46,67       7,21         RIGHT       680       713,00       38,18       7,21         RIGHT       614       647,00       46,67       7,21         RIGHT       680       728,50       149,20       19,04         LEFT       678       728,50       248,19       34,07         RIGHT       553       750       720       699,50       41,72       5,96         S50       11       LEFT       670       70       70       70       70         S51       814       673       673,50       283,55       42,10       70         S52       P       LEFT       670       72       72       670,00       78,19       26,60         LEFT       670       76       76       76       70       70       76,00       76,10         S52       P       LEFT       766 <t< td=""><td>43</td><td>3</td><td>LEFT</td><td>490</td><td>440,50</td><td>70,00</td><td>15,89</td></t<>	43	3	LEFT	490	440,50	70,00	15,89
A6     10     LEFT     686     713,00     41,01     10,30       46     10     LEFT     686     713,00     38,18     5,36       10     LEFT     740     713,00     46,67     7,21       11     LEFT     680     783,50     149,20     19,04       48     11     LEFT     678     728,50     248,19     34,07       150     11     LEFT     678     729     699,50     41,72     5,96       50     11     LEFT     670     729     699,50     41,72     5,96       160     LEFT     670     729     699,50     41,72     5,96       52     9     LEFT     574     670,00     178,19     26,600       152     9     LEFT     796     796     796       154     670,00     178,19     26,600     11,24       155     RIGHT     660     717,00     80,61     11,24			LEFT	391			
A6       10       RIGHT       369         46       10       LEFT       686       713,00       38,18       5,36         LEFT       740			RIGHT	427	398,00	41,01	10,30
46         10         LEFT         686         713,00         38,18         5,36           LEFT         740         740         680         721         721           RIGHT         614         647,00         46,67         721           48         11         LEFT         889         783,50         149,20         19,04           48         11         LEFT         678         721         721         721         721           50         11         LEFT         678         721         721         723         723         723         7248,19         34,07           50         11         LEFT         670         721         726         721         726         721         726         721         726         721         726         721         726         721         726         721         726         721         726         721         726         721			RIGHT	369			
LEFT         740           RIGHT         614         647,00         46,67         7,21           48         11         LEFT         680         149,20         19,04           48         11         LEFT         678         149,20         19,04           10         LEFT         678         149,20         14,07           11         LEFT         678         149,20         34,07           11         LEFT         678         149,20         34,07           11         LEFT         670         14,12         5,96           11         LEFT         670         14,12         5,96           11         LEFT         670         14,12         5,96           12         RIGHT         874         14,12         5,96           14         LEFT         670         17,00         17,10         26,60           152         9         LEFT         796         11,24         11,24           157         RIGHT         660         71,700         80,61         11,24	46	10	LEFT	686	713,00	38,18	5,36
RIGHT         614         647,00         46,67         7,21           RIGHT         680         680         10         10           48         11         LEFT         889         783,50         149,20         19,04           LEFT         678         728,50         248,19         34,07           RIGHT         904         728,50         248,19         34,07           RIGHT         553         70         11         10         10           50         11         LEFT         670         72         10         10           FIGHT         670         71         71         72         10         10         10           F1         LEFT         670         72         10         10         10         10         10         10           52         9         LEFT         796         796         11,24         11,24         11,24           RIGHT         660         717,00         80,61         11,24         11,24			LEFT	740			
RIGHT         680           48         11         LEFT         889         783,50         149,20         19,04           LEFT         678         728,50         248,19         34,07           RIGHT         904         728,50         248,19         34,07           RIGHT         553         729         699,50         41,72         5,96           50         11         LEFT         670         728         729         699,50         41,72         5,96           52         RIGHT         473         673,50         283,55         42,10           F2         P         LEFT         670         728			RIGHT	614	647,00	46,67	7,21
48     11     LEFT     889     783,50     149,20     19,04       LEFT     678     728,50     248,19     34,07       RIGHT     904     728,50     248,19     34,07       RIGHT     553     728,50     248,19     5,96       50     11     LEFT     729     699,50     41,72     5,96       LEFT     670     728,50     283,55     42,10       RIGHT     473     673,50     283,55     42,10       52     9     LEFT     544     670,00     178,19     26,60       LEFT     796     796     71,700     80,61     11,24       RIGHT     660     717,00     80,61     11,24       RIGHT     774     74     71,700     71,70			RIGHT	680			
LEFT         678 RIGHT         904         728,50         248,19         34,07           50         11         LEFT         553         699,50         41,72         5,96           50         11         LEFT         670         729         699,50         41,72         5,96           10         LEFT         670         729         673,50         283,55         42,10           11         LEFT         473         673,50         283,55         42,10           152         9         LEFT         544         670,00         178,19         26,60           12         LEFT         796         796         796         71,700         80,61         11,24           12         RIGHT         660         717,00         80,61         11,24	48	11	LEFT	889	783,50	149,20	19,04
RIGHT         904         728,50         248,19         34,07           RIGHT         553         50         11         LEFT         553         50			LEFT	678			
RIGHT         553           50         11         LEFT         729         699,50         41,72         5,96           LEFT         670         673,50         283,55         42,10           RIGHT         473         673,50         283,55         42,10           BUGHT         874         729         52         9         LEFT         544         670,00         178,19         26,60           LEFT         796         796         74         74         74         74         74			RIGHT	904	728,50	248,19	34,07
50         11         LEFT         729         699,50         41,72         5,96           LEFT         670         673,50         283,55         42,10           RIGHT         473         670,00         178,19         26,60           52         9         LEFT         796         796         717,00         80,61         11,24           RIGHT         774         774         774         71,20			RIGHT	553			
LEFT         670           RIGHT         473         673,50         283,55         42,10           S2         9         LEFT         544         670,00         178,19         26,60           LEFT         796         100         11,24           RIGHT         660         717,00         80,61         11,24	50	11	LEFT	729	699,50	41,72	5,96
RIGHT         473         673,50         283,55         42,10           RIGHT         874         574         570,00         178,19         26,60           LEFT         796         796         11,24           RIGHT         660         717,00         80,61         11,24			LEFT	670			
52     9     EFT     544     670,00     178,19     26,60       LEFT     796       RIGHT     660     717,00     80,61     11,24       RIGHT     774			RIGHT	473	673,50	283,55	42,10
52 9 LEFT 544 670,00 178,19 26,60 LEFT 796 RIGHT 660 717,00 80,61 11,24 RIGHT 774			RIGHT	874			
LEFT 796 RIGHT 660 717,00 80,61 11,24 RIGHT 774	52	9	LEFT	544	670,00	178,19	26,60
RIGHT 660 717,00 80,61 11,24 RIGHT 774			LEFT	796			
RIGHT 774			RIGHT	660	717,00	80,61	11,24
			RIGHT	774			

#### Table 5 (continued)

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, Software. 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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