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HYDROGEN ION CONCENTRATION(P^H) OF VAGINA AND VAGINAL SECRETION AND ITS RELATIONS WITH DIFFERENT REPRODUCTIVE STATES IN COWS

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ABSTRACT

This study was achieved on 75 cross breed cows (Jarubi X fresian) , The P^H of vagina and its secretion was measured for all cows during the different oesturs phases (proestrus, estrus and during different stages of pregnancy) . P^H was measured by using P^H paper. Results revealed that vaginal P^H of cows tends to be alkaline during proestrus; estrus and during luteal phase but in case of pregnancy the vaginal P^H becomes acidic on the contrary to that of ewes. Results also indicated that there is no significant effect of neither cows age nor pregnancy frequency on P^H Values of cows vagina and its secretion; results also showed that vaginal P^H and its secretion had no signification effect on correlation between them.

Results cleared that it is possible to diagnose pregnancy by means of P^H values during different stages of pregnancy in an accuracy of 100% in pregnant cows confirmed by rectal palpation. There was significant effect of pregnancy on P^H values of cows vagina audits secretions due to the high significant different ($P < 0.01$) than the P^H during proestrus and estrus.

INTRODUCTION

Few published studies indicated that P^H of vagina and its secretions during estrus cycle in cows plays an important role in the reproductive state and any chemical change of these secretions will affect the process of ova fertilization (17) and (14) the secretary activity of vaginal wall lining responded to changes occurs in ovulatory cycle; such changes in vaginal secretions is useful in diagnosis of proestrus; estrus and early pregnancy. (16) and (8) also (11) indicated that P^H of vagina and its secretion in cows has an effect in the control of foetal sex ratio when they indicated that vagina of acidic medium leads to production of female fetuses and vagina of alkaline medium leads to produce male fetuses this result also confirmed by (2) and (1) when they changed vaginal P^H by means of vaginal washing by phosphate buffers of different P^H in ewes. Also (3); (2) and (12) insisted on the efficiency of pregnancy diagnosis by using P^H measurements in ewes this study was done to know the effect of P^H values of vagina and its secretion during different stages of oestrus cycle on fertility percentage in cross bred cows in southern of Iraq (Basrah) and also the effect of cows age on vaginal P^H values , and to record

vaginal P^H values during pregnancy ; its stages and frequency in a trial to early pregnancy diagnosis by means of measuring P^H and diagnosis by rectal palpation during advanced pregnancy , also to know the cyclical changes during estrus comparing them with changes occurs in tuteal phase , in addition, these informations will help in finding infertility problems in cows assisting in putting solution and treatment .

MATERIAL AND METHOD

This study was done on 75 cross bred cows (Janubi X Fresian) belonged to Shat Al-Arab company for animal production , those cows divided according to their ages into five groups of 15 cows each as follows :- 1-2 Years ; 2-4 years ; 4-6 years ; 6-8 years and 8-10 years . P^H of vagina and its secretion for all cows during the different oesturs cycle phases ((Proesturs; estrus and affer insemination)); during the early pregnancy and continued through the advanced months of pregnancy P^H was measured by means of P^H paper graduated from (1-14) produced by ((BDH)) company.

Age determination for all cows was done by dention and from number of pregnancies. After insemination and when pregnancy occurs when cows did not return to ostrus again we continued to measure the P^H and when pregnancy reaches the fourth month of gestation rectal palpation was achieved for all cows to ascertain the results of palpate pregnancy diagnosis with the results of P^H reading.

Comparison of age groups of cows according to their reproductive state (non pregnant, in the estrus and pregnant)); also the comparison between more than reproductive cases so two ways analysis of variance was used; The two test were used according to (18) and when get a significant value for ((F)) we used Duncan multiple range and F test according to (5), also correlation coefficients was calculated between P^H value and fertility percentages according to the following equation

(21) :-

$$r = \frac{Covxy}{Sxsy}$$

r = correlation

x = P^H value

y = fertility percentage

Covxy = variance between x and y

Sy and Sx = slandered deviation for each x and y

RESULTS AND DISCUSSION

Table (1); (2) and (3) indicates P^H value of proestrus; estrus and during pregnancy respectively. It is clear from the above tables that there is no statistical significant effect of cows age on P^H value within the same reproductive state of different stages, it is also clear that P^H values during proestrus, estrus and luteal phases are alkaline, it means their values in the different age stages are more than 7 and it increased during estrus to reach 7.95 but it never exceed 8; these results are agreed with that of (20) when they mentioned that P^H values are alkaline during all oestrus cycle phases. and the alkalinity is increased especially during estrus in this study which is higher than the previous state (proestrus), this result also resembles the same results mentioned by (14) when mentioned that there is a wide range in P^H value of vagina between ((6-7)) during the luteal phase. Also very near results recorded by (4) when found that 74% out of 400 cows their vaginal P^H were between 6-7

Table (1): Effect of age on vaginal P^H in Liuteal phase of non pregnant cows

×+ *S.D* P^H	*Number of animals*	*Age groups (years)*
7.20 ± 0.3	15	1-2
7.28± 0.3	15	2-4
7.14 ± 0.14	15	4-6
7.43 ± 0.13	15	6-8
7.36 ± 0.23	15	8-10
7.24 ± 0.25	75	General mean over all sum.
N.S		Significancy

N.S = non significant

Table (2);Effect of age on vaginal P^H of cows during estrus

×+ *S.D* P^H	*Number of animals*	*Age groups (years)*
7.83 ± 0.15	15	1-2
7.85± 0.14	15	2-4
7.90 ± 0.16	15	4-6
7.95 ± 0.17	15	6-8
7.90 ± 0.14	15	8-10
7.88 ± 0.12	15	Summation and average
N.S	75	Significancy

N.S = non significant

Table (3);Effect of age on vaginal P^H of pregnant cows

×+ *S.D* P^H	*Number of animals*	*Age groups (years)*
6.189 ± 0.60	11	1-2
5.824 ± 0.58	12	2-4
5.760 ± 0.62	13	4-6
5.70 ± 0.61	12	6-8
5.920 ± 0.59	12	8-10
5.933 ± 0.54	60	General average and summation
N.S		Significancy

N.S = non significant

Also our result are exactly agreed with what is found by each of (13) and (15) when they found values of 7.8 and 7.9 for P^H during estrus (table 4).

These results indicate normal state of reproduction in cows but it was indicated that vaginal P^H and its secretion is effected by infection when it was recorded that infection rises the P^H value which is a common cause of infertility (14) also our results are exactly coinciding with that of (17) during estrus in cows and buffaloes also identical with that of (7)in cows and also corresponded to that found by (19) in buffalos in spite of little elevation found by their study when recorded P^H of 8.12 during estrus but during luteal phase and proestrus so in spite of identical results at this study with that of (20) but result of (17) disagree with result of this study when they recorded acidic values of 6.65 and 6.50 for both cows and buffaloes respectively .It seems that alkaline P^H values during estrus is very suitable for fertilization process as it appears from the high percentage of fertility in alkaline PH values during estrus (table 5)and this is on the contrary to that found by (2) in ewes when he did not get any pregnancy case in ewes when mated after their vaginal wash with phosphate solution of P^H 7.7 .Our results also confirmed by what is reached by (6) when they declared that the least fertility percentage is found in a neutral P^H of 7 and the fertilization percentage is Normal at P^H 7.5 but it was excellent at P^H 8.25 so they said that P^H of vagina and its secretion during . Estrus is regarded a good medium for transportation of spermatozoa but perhaps P^H values is not suitable for spermatozoal transportation during luteal phase. But (19) and (10) did not sustain the benefit of alkalinity of vaginal mucous to play an important role in spermatozoal transportation and help them to penetrate the ovum wall when they pointed out that vaginal secretion did not appear to significantly affect the reproductive state in buffaloes , but results of (9) did not agreed with what is pointed out by this study and other studies of the same results when he declared that when vaginal mucous P^H increased from 7 to 7.6 , the pregnancy percentage creased from 55.6% to 9.5%. Table number (6) shows that frequency of pregnancy had no significant effect on P^H

values in different stages(during proestrus or during estrus or during pregnancy and we did not found in literature what is agreed with this result or not .Table number (7) shows percentages of pregnancy diagnosis in cows inseminated in different age groups. This pregnancy diagnosis was done by measuring the acidic P^H of vagina of cows after their insemination and after passing complete oestrus cycle or more from the insemination; this pregnancy diagnosis was then confirmed by diagnosis by rectal palpation .The percentage of pregnancy diagnosis by vaginal P^H reached 100% and this result is completely confirmed by what is found by (12). The accuracy of this pregnancy diagnosis is more than the accuracy found by (2) when he reached to a percentage of 82% after 105 days of pregnancy in ewes. Also our percentage is more Than the percentage found by (3) which reached 86%. It was appeared that there was a high significant effect ($P < o.o1$) of pregnancy to change the P^H of cows vagina (table 4) and this is completely coincided to what is found by (2) in spite of the different in this change in cows towards the acidity and in ewes to wards the alkalinity.

Table (4);Comparison of vaginal P^H at proestrus; estrus and at pregnancy in different age group of cows

P^H *at pregnancy* ×+ *S.D*	P^H *at estrus* ×+ *S.D*	P^H *at proestrus* ×+ *S.D*	*Number of animals*	*Age group (years)*
$6.189 \pm o.60^B$	$7.83 \pm o.15^A$	$7.20 \pm o.3^A$	15	1-2
$5.824 \pm o.58^C$	$7.85 \pm o.14^A$	$7.28 \pm o.3^A$	15	2-4
$5.76 \pm o.62^D$	$7.90 \pm o.16^A$	$7.14 \pm o.14^A$	15	4-6
$5.70 \pm o.61^E$	$7.95 \pm o.17^A$	$7.43 \pm o.13^A$	15	6-8
$5.92 \pm o.59^F$	$7.90 \pm o.14^A$	$7.36 \pm o.23^A$	15	8-10

Different letters differs significantly ($P < o.o1$)

Table(5);Effect of age and vaginal P^H at insemination on fertility percentage

Age groups (years)	*Number of animals*	*P^H during insemination* ×+ *S.D*	*Number of inseminated cows*	*Number of pregnant cows*	*Fertility percentage*
1-2	15	7.83 ± 0.10	15	11	73.3%
2-4	15	7.85 ± 0.14	15	12	80%
4-6	15	7.90 ± 0.16	15	13	86%
6-8	15	7.95 ± 0.17	15	12	80%
8-10	15	7.90 ± 0.14	15	12	80%
Average and summation	75	7.88 ± 0.12	75	60	80%
	N.S	N.S	N.S	N.S	N.S

N.S.= Not significant

Table (6);Effect of numbers of pregnancies on vaginal P^H of cows

Reproductive state	*First Preg.*	*2nd Preg.*	*3rd Preg.*	*4th Preg.*	*5th Preg.*	*6th Preg.*	*7th Preg.*
Before estrus	7.28 ± 0.22	7.08 ± 0.21	7.35 ± 0.15	7.35 ± 0.15	7.40 ± 0.10	7.5 ± 0.01	7.6 ± 0.08
During estrus	7.88 ± 0.12	7.75 ± 0.15	7.88 ± 0.13	7.80 ± 0.16	7.93 ± 0.14	8 ± 0.10	7.9 ± 0.12
After pregnancy	6.189 ± 0.60	5.87 ± 0.37	5.857 ± 0.32	5.93 ± 0.57	5.70 ± 0.10	5.60 ± 0.25	5.5 ± 0.15
Significant	N.S	N.S	N.S	N.S	N.S	N.S	N.S

N.S – Not significant

Table (7); Percentage of pregnancy diagnosis from vaginal P^H value confirmed by rectal palpation diagnosis

Age group (years)	*Number of inseminated cows*	*Number of pregnant cows*	*P^H of pregnant cows ×+ S.D*	*Percentage of preg. Diagnosis*
1-2	15	11	6.189 + 0.60	100%
2-4	15	12	5.824 + 0.58	100%
4-6	15	13	5.76 + 0.62	100%
6-8	15	12	5.70 + 0.61	100%
8-10	15	12	5.92 + 0.59	100%
Average summation	75	60	5.93 + 0.54	100%
Significant	N.S	N.S	N.S	N.S

N.S = Not significant

Table (8);Changes in vaginal P^H during different period of pregnancy

Gestation period (days)	P^H value ×+ S.D
60	5.8 - 6
90	5.5 - 6.5
120	5.5 - 5.6
150	5.7 - 5.9
180	5.8 - 6
210	5.9 - 6
240	6 - 6.2
270	6.2 - 6.7
Significant	N.S

N.S = Not significant

الأس الهيدروجيني (P^H) للمهبل والإفرازات المهبلية وعلاقته بمختلف الحالات التناسلية في الأبقار

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الخلاصة

أجريت هذه الدراسة على ٧٥ بقرة مضربة (جنوبي X فريزيان) حيث تم قياس الأس الهيدروجيني للمهبل وإفرازاته لجميع الأبقار في مراحل دورة الشبق (قبل الشبق ، أثناء الشبق وإثناء الحمل) باستعمال ورق كاشف الأس الهيدروجيني (P^H) Paper للأبقار يميل نحو القاعدية في مراحل ما قبل الشبق وفي أثناء الشبق وفي مرحلة الاصفري، أما في حالة الحمل فيكون الأس الهيدروجيني حمضياً عكس ما هو عليه في النعاج وبينت النتائج ايضا بأنه ليس هناك تأثير معنوي لعمر الأبقار ولا لتكرار الحمل على قيم الأس الهيدروجيني لمهبل الأبقار وإفرازاته . وتبين ايضا بأنه ليس هناك تأثير معنوي للأس الهيدروجيني على نسبة الخصوبة رغم وجود معامل ارتباط موجب بينهما، وأوضحت النتائج بأنه يمكن تشخيص الحمل بواسطة قيم الأس الهيدروجيني أثناء مراحل الحمل المختلفة وبدقة ١٠٠% في الأبقار الحوامل .

وكان هناك تأثير معنوي للحمل على قيم الأس الهيدروجيني لمهبل الأبقار وإفرازاته حيث كان الفرق عال المعنوية ($P < 0.01$) عما هو عليه في مرحلة الشبق وما قبل الشبق.

REFERENCES

1- Kalby, J.M.A. (1999) Effect of some treatments on viability to rams and bucks spermatozoa MSC thesis, college of agriculture University of Basrah (in Arabic).

2- AL-Mahmood, W.D.A. (1996) : Effect of vaginal P^H in the sexual percentage and fertility and its importance in pregnancy diagnosis in arabi ewes. MSC thesis, college agriculture University of Basrah(in arabic).

3- AL- Taha, T.J., AL-Diwan, M.A. and Al- Mahmood W.D. (1991): The effect of Vaginal P^H and vaginal and rectal temperatures on pregnancy diagnosis in arabi ewes Basrah j. Agric. Sci. 12(1).

4- Doutherty, R.W.(1944): Invitro determination of the H ion concentration of the vaginas of dairy cows. No.Am.Vet. 22:216-219 ((cited by Salisbury *etal* 1978)).

5- Duncan, D.B.(1955):Multiple range and multiple((F)tests. Biometrics, 11:1-42 anim.prod. 15:311-14.

6- EL-Banna, A.A and Hafez, E.S.E. (1972): then uterine cervit in mammals. AM.J. obstel. Gynec. 112- 149.

7- Gupta, K.C.; K.K. Vyas; P.K pareek and P.K Dwara Kntha, (1981):- Note on sperm and cervical mucous incompatibility in repeat – breeding cows. Indian. J. Anim. sei 51(10):981.

8- Horvath, G.Y. (1963): Diagnosis of pregnancy of domestic animals by means of vervix mucous reaction and desiccation results. Anim. Breed. Abstr. 31:310.

9- Kulitis, E. (1963): Conception in relation to properties of the mucous of the beginning of oestrus in cow. Anim. Breed. Abstr. Vol.4 (3) PP 62.

10- Mann, T.(1964):The Biochemistry of semen and the male reproductive tract. PP 150.

Methem and CO, London.

11- Mcphee, H.C. and O.N.Eaton (1942): Experimental attempts to modify the sex ratio hered. 33, 422-433 ((Cited by Salisbury (1978):P117.

12- Mohammed Saleh, Z.A. (1998): pregnancy and sex of fetus, their diagnosis and effect on some blood characteristics of arabi ewes. MSC Thesis; College of science University by Basrah (In Arabic).

13- Olds, D. And Van Demark, N.L. (1957): Composition of luminal fluids in bovine female genitalia. Fert and Ster. 8:345-354.

14- Salisbury, G. W; Van demarks, N.L. And Lodge J.R.(1978): Physiology of reproduction and artificial insemination of cattle.W.H. Freeman and company sanfran cisco.

15- Smith, S.E. and as dell, S.A (1944): The P^H of Vaginal mucous of normal and sterile dairy cows. Am.J.Vet. Res. 2:167-174.

16- Scott, Blair, G.W. Folley, S.J. Malpress. F.H. and coppen, F.W. V. (1941): Variation in certain properties of oestrus cycle. Biochem .J. 35:1039.

17-Shehata, Y.M; A.A Yousef and M.M. Fowzy. (1978): some Physical characters of cervical mucous of cows and buffaloes. Indian J.Ami. Sci. 48 (10) 720-723.

18- Steel, R.G. and Toorie, J.H. (1960): principles and procedures of statistics. McGraw – Hill Book Co. INC. New York.

19- Thakur. (1981): Cervico – Vaginal secretion in Buffaloes. Indian. J.Anim. Sci. Vol. 51 No. 12 P 1133-1135.

20- Valdivia , R.R. and Vallenas P.A (1961) : Some physiological Variation in the estrus cycle in cows . Rectal and cervical temperature of cervical Secretion (Lab Fisiol. Univ. Nac. Mayor san Marcos Limasol). Anim . Breeding. Abstr. Vol. 4 P 61.

21- AL-Rawi(1979): Expermental design of agricultural experiments University of Musol Minstry of higher education and scientific research .