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Ultrasonographical and hormonal comparative between true and postpartum anestrus of cows in south of Iraq

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***Abstract*---**Anestrus is one of the major reproductive problems. A total of 218 local breed cows were diagnosed as 105 cows with true anestrus and 113 cows with postpartum anestrus. The results indicated that most cases of postpartum anestrus were concentrated from December to May, while the true anestrus occurred from May to September. The most important causes that were diagnosed by ultrasound for true anestrus cases were inactivity of the ovaries and anovulatory follicles. A high percentage of postpartum anestrus cases were suffered from luteinizing cysts, ovarian inactivity. Hormonal assay for inactive ovaries in true and postpartum anestrus cases revealed a significant decrease ($p<0.05$) in the levels of estrogen, progesterone, FSH and LH. While the hormonal results of postpartum anestrus cases revealed a significant decrease ($p<0.05$) in the estrogen with a significant increase ($p<0.05$) in the progesterone in case of luteal cyst, persistent corpus luteum and cystic corpus luteum which accompanied by a significant increase ($p<0.05$) in the prolactin .The ultrasonographical features for true anestrus showed an increase in echo rates for ovaries. In postpartum anestrus cases the luteal cyst revealed 2.88-2.90cm follicle like structure. While the cases of persistent corpus luteum showed 1.15cm-1.75cm dense theca tissue.

***Keywords*---**anestrus, postpartum, ultrasonographical, hormonal assay, significant.

Introduction

Anestrus is the biggest cause of economic waste in a dairy cow (Kumar et al., 2020).large variation on incidence of anestrus has been reported in many researches which depended on species, breed, parity, season, nutritional condition, management, environment and climate (Abdisa , 2018). In general, the incidence of anestrus in cows varies and depending on the conditions surrounding the animal, which reached in some studies more than 50% in dairy cows (Jawad et al., 2020 and Garba et al., 2021). The correct diagnosis for the reasons of anestrus in cows plays a major role in choosing the appropriate treatments which responsible for showing estrus and the normal function of reproductive system (Abraham, 2017). rectal palpation and Clinical examination were used in the diagnosing of anestrus causes in cows, although there are many uterine and ovarian diseases that cannot be accurately diagnosed by rectal palpation, therefore its require more accurate techniques and methods for diagnosis and optimal treatment (Khudhair et al., 2021).

One of the most important techniques which are widely used for diagnosis the pathological case is ultrasonography (Jyoti et al., 2019). Sonography imaging its technique that uses high frequency waves of sound to determine the pathological tissues and internal organs (Hayward, 2012). Diagnostic ultrasound is called diagnostic medical sonography also; it's a method that uses high frequency waves to produce images of structures in body. It also provides reliable information for diagnosing and it's provided the opportunity to treat many cases of diseases (Mimoune et al., 2021). Our study is designed to study distribution types of anestrus according to the months of the year in cows and Ultrasonographical evaluation of characteristic features for the causes of anestrus.

Materials and Methods

Animals and Study area

A total of 218 local breed cows (aged three to seven years) from private farms in south of Iraq, Basrah and Nasiriya province), were diagnosed as 105 cows with true anestrus (the cows didn't come in to estrus after several months from parturition due to inactive ovary) group I and 113 cow with postpartum anestrus (the cow didn't come in to estrus after 100 day from parturition) group II according to case history, clinical signs and ultrasonographical evaluation (Gautam, 2020). Other 10 cows apparently healthy in estrus phase were used as a control group III.

Ultrasound Examination

Ultrasonography was done by insert transducer probe using multi frequency linear rectal probe (5.0 MHz) (Sofi & Singh 2018). The transducer face was lubricated with a suitable coupling medium (Ultra sonic Gel ® for Medical use) and was usually covered by a lubricated plastic sleeve before insertion. The transducer was then progressed cranially along the rectal floor to overlie the reproductive tract. The ultra sound screen and the human eye were at similar level for accurate interpretation of ultrasound images. Cows were examined and

observations were recorded followed by TRUS of the whole genital tract. Generally B-mode real-time ultrasonography was used. The reproductive tract of each anestrus cow was examined (cervix, horn of uterus and ovaries). Cervix was normal in shape; uterus horns were maximally flabby during anestrus. Ultrasound evaluation of the diameter, shape of uterus, layers of the uterine wall and the fluid of pus was accumulated inside the cavity of uterus. The ovary also evaluated, in a true and postpartum anestrous and estrus control group.

Blood Sampling and hormonal assay analysis

Blood samples (10ml) were collected from jugular vein puncture from all groups. The collected blood samples were kept in the gel tubes and left for 30 minutes, and then the serum was obtained by centrifugation of the blood at 3000 rpm for 15 minutes and stored at -20C° in micro- Eppendorf tubes until hormonal assay by Enzyme-Linked Immune Sorbent Assay (ELISA) technique. A specific hormone kit (Bio Merium) was used to detect the level of each hormone according to the manufacturer's instructions (Monobind Inc. lake forest CA 92630, USA).

Results and Discussions

Distribution of anestrus cases throughout the year

The results of current study showed that there was a slight increase in the cases of anestrus during the temperate climates months (March to May). The rates of anestrus continue to increase during the hot months starting from June to August. A clear decline in the cases of anestrus occurred during the autumn months (September to November), followed by a slight increase in rates of anestrus in cold months (December to January) (Figure 1).

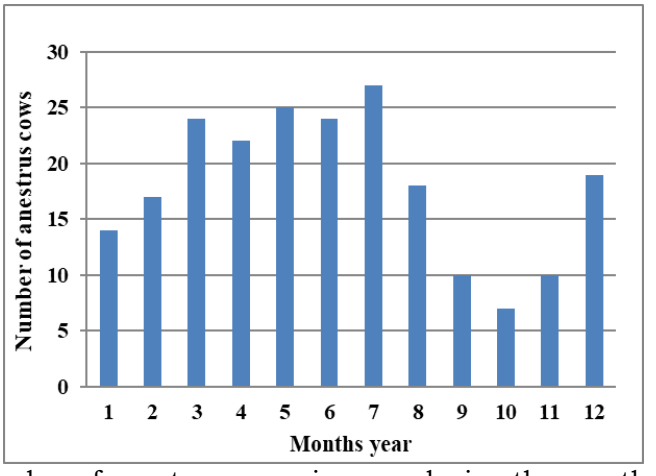

Figure 1. Number of anestrus cases in cows during the months of the year

The results also indicated that most cases of post-partum anestrus (which exceeded 100 days after parturition and did not show signs of estrus) were concentrated from December to May as in (Table 1), which begins to decline gradually from June till November (Table 1). As for true anestrus (several months

after parturition) the results showed that most of the cases were belong the hot months starting from May to September, then followed by a sharp decrease during the temperate and cold months of the year from October to the end of April as in (Table 1).

Table 1
Distribution of anestrus types in cows according to the months of the year

Months of year	No. of Anestrus cases	
	True anestrus	Postpartum anestrus
January	2	12
February	4	13
March	4	20
April	6	16
May	13	12
June	19	5
July	22	5
August	14	4
September	7	3
October	4	3
November	5	6
December	5	14
Total	105	113

Distribution of anestrus cases according to the diagnosed causes

As for the most important causes that were diagnosed by ultrasound for true and postpartum anestrus cases it was as follows, most of the causes of true anestrus were inactivity of the ovaries which included 97 case suffered from inactive ovaries while the other 8 cases were suffered from anovulatory follicles. These cases are accompanied by low rate of inflammation, adhesions and oviductal obstruction (Table 2). The results confirmed the efficiency of the ultrasound device in diagnosing oviductal obstructions as a result of increasing in the diameter of the oviduct due to filling with inflammatory fluids (hydrosalpinx), which appeared in 5 cases which suffered from symptoms of true anestrus as shown in (Table 2).The results also revealed a high percentage of postpartum anestrus cases were suffered from luteinizing cysts and uterine inflammation which formed 67 and 33 time respectively from the total postpartum anestrus cases (Table 2). While ovarian inactivity (inactive ovaries and anovulatory follicles), persistent corpus luteum and cystic corpus luteum were appeared in 28, 14 and 9 cases respectively from postpartum anestrus cases (Table 2). The study also indicated that 10 cases from postpartum anestrus case were suffered from para ovarian cysts which accompanied the cases of luteal cysts as in (Figure 12) and (Table 2).The current study also showed that 4 cases out from 113 postpartum anestrus case were suffering from a silent and undetectable estrus despite the efficiency of the reproductive system and the efficiency of the ultrasound in detection silent estrus from abnormal anestrus.

Table 2
Distribution of anestrus cases in cows according to the diagnosed causes and the appearance times of each one

Type of anestrus	No.	Diagnosed causes	Appearance times*
True anestrus	105	Inactive ovaries	97
		Anovulatory follicles	8
		Uterine inflammation	32
		Ovarobursal adhesions	8
		Oviductal obstructions	5
Postpartum anestrus	113	Luteal cyst	67
		Inactive ovaries	28
		Uterine inflammation	33
		Persistent corpus luteum	14
		Cystic corpus luteum	9
		Para ovarian cyst	10
		Silent estrus	4
Total	218	----	----

* Some cows showed more than one cause, so it was expressed by the number of appearance times

Hormonal examination for anestrus cases

Subsection According to the hormonal study for true and postpartum anestrus cases, the results confirmed that the cases of true anestrus which diagnosed by ultrasound device had a significant decrease ($p<0.05$) in the levels of estrogen, progesterone, FSH and LH in compared control group(Table 3), and these results confirms the diagnosis of true anestrus by ultrasound. While the hormonal results of postpartum anestrus cases which showed a luteinizing activity (luteal cyst, persistent corpus luteum and cystic corpus luteum) revealed a significant decrease ($p<0.05$) in the level of estrogen with a significant increase ($p<0.05$) in the progesterone which was accompanied by a significant increase in the prolactin comparing control (Table 3).While the hormonal results of inactive ovaries in cases of postpartum anestrus were similar to the cases of inactive ovaries in true anestrus with a significant increase ($p<0.05$) in prolactin compared with inactive ovaries in true anestrus, which confirms the efficiency of the ultrasound device in diagnosing cases of postpartum anestrus. As for the cases of silent estrus, the hormonal results showed that there was no significant difference for estrogen, progesterone, LH and FSH in compared control (Table 3).

Table 3
Hormones level for estrogen , progesterone, FSH, LH and prolactin in true and postpartum anestrus cows

Type of anestrus	Diagnose causes	Estrogen pg/ml	Progesterone ng/ml	FSH mlU/ml	LH mlU/ml	Prolactin ng/ml
True anestrus	Inactive ovaries	$< 5^{a}$	$< 0.05^{a}$	$< 0.05^{a}$	$< 0.05^{a}$	2.23 ± 0.89^{a}
	Luteal activity	$< 5^{a}$	9.70 ± 2.55^{b}	$< 0.05^{a}$	9.13 ± 1.77^{b}	24.95 ± 7.68^{b}
	Inactive ovaries	$< 5^{a}$	$< 0.05^{a}$	$< 0.05^{a}$	$< 0.05^{a}$	13.73 ± 3.92^{b}

Postpartum anestrus	Silent estrus	39.35±7.87[b]	0.83±0.34[c]	0.88±0.24[b]	1.13±0.23[c]	17.52±2.31[b]
Control	Follicular phase	67.43±11.62[c]	0.65±0.13[c]	1.63±0.40[b]	1.72±0.44[c]	7.62±1.80[a]

Data are presented as (mean ± SEM), Different letters within each column indicate significant difference ($p<0.05$) among groups

Ultrasonographical features of anestrus cases

Table (4), shows the characteristic features for the reproductive system in cows that suffered from true or postpartum anestrus. The results showed an increase in echo rates for cases of inactive ovaries which devoid from structures (Figure 2), and accompanied with smooth gray hyper echogenic uterine horns and unclear borders rings in transvers section due to ovarian inactivity (Figure 3).

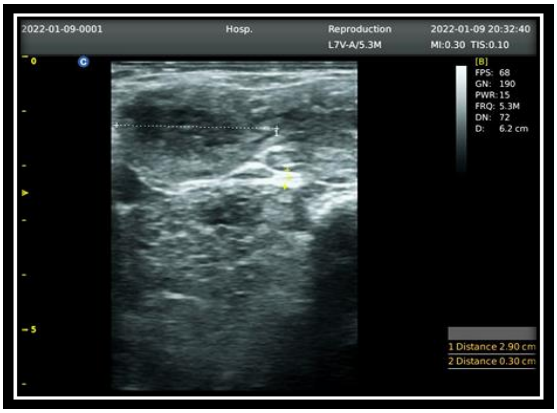

Figure 2. Ultrasound image of the ovary show smooth gray iso echoic with a high echoic in border due to the absence of follicles using a 5 MHz trans rectal transducer

Figure 3. Ultrasound image of uterine horns are more echogenic and unclear due to ovarian inactivity in true anestrus using a 5 MHz trans rectal transducer

While the cases of uterine infections indicated that the uterus is filled with inflammatory fluids which appeared as a dense and hyper echoic in true anestrus cases than post-partum anestrus cases which revealed a hypo echoic and close to the echoic shape of normal fluid or urine. While the lining of the uterus in true

anestrus cases was took 0.59 cm thicker than uterine infections of post-partum anestrus cases which took 0.35 cm (Figure 4).

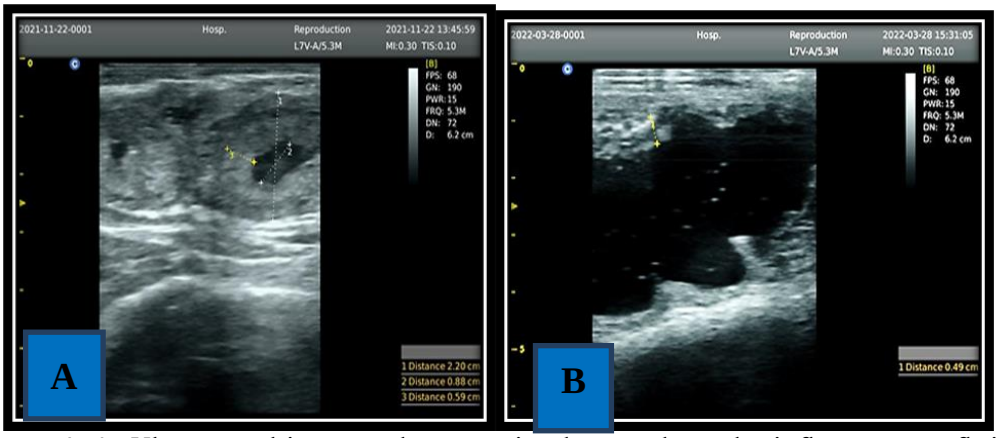

Figure 4. A- Ultrasound images show uterine horns show the inflammatory fluids that appear high echoic in true anestrus, B- show uterine horns show the inflammatory fluids that appear low echoic in PPA using a 5 MHz trans rectal transducer

The results confirmed the efficiency of the ultrasound device in diagnosing adhesions and oviduct obstructions. The cases of adhesion appeared as a hyper echoic zoon adjacent the ovary ventrally (Figure 4-5).While the cases of oviductal obstructions showed a fluid accumulation inside oviduct canal that appeared as a hypo echoic zone with 0.20-0.30cm in diameter and 1.26-1.31cm in length (Figure 4-6, 4-7).

Figure 5. Ultrasound image of the ovary ovarobursal adhesion 1.11 cm, related with luteal cyst using a 5 MHz trans rectal transducer

Figure 6. Ultrasound image of the ovary show obstruction of the oviduct and fluid accumulation inside it with luteal cyst using a 5 MHz trans rectal transducer

Figure 7. Ultrasound image show obstruction of the oviduct and fluid accumulation inside its canal diameter 0.20-0.30 cm, obstruction length 1.26 cm using a 5 MHz trans rectal transducer

In the case of luteal activity that accompanied postpartum anestrus cases which includes luteal cyst, persistent corpus luteum and cystic corpus luteum, the results of the ultrasound showed that the luteal cyst revealed 2.88cm-2.90cm follicle like structure containing fluid that appeared hyper echogenic and contains dense theca tissue more echoic than ovary (Figure 8). While the uterine horns appeared as a less echogenic and clear gray ring in transvers section (Figure 9). While the cases of persistent corpus luteum showed 1.15cm-1.75cm dense theca tissue more echoic than ovarian echogenicity (Figure 10). The uterine horns in this case appeared as a hyper echogenic and clear gray ring in transvers section (Figure 9). On the other hand the cystic corpus luteum appeared as a mass hyper echoic than follicle surrounding the ovarian parenchyma and contain a central cavity in compared corpus luteum and took 1.33cm in length (Figure 11). Uterine horns are hyper echogenic and clear gray ring in transvers section.

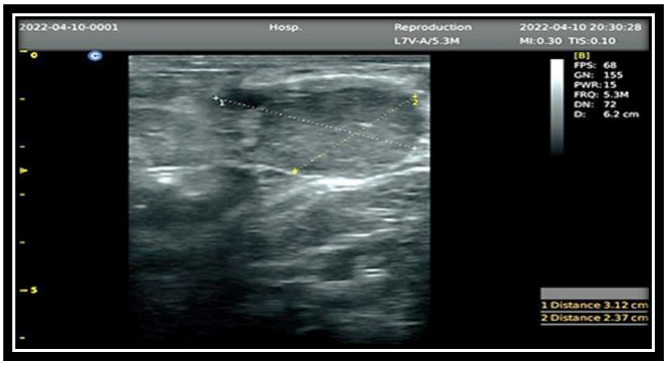

Figure 8. Ultrasound image of the ovary show luteal cyst with dense theca tissue more echoic than ovary using a 5 MHz trans rectal transducer

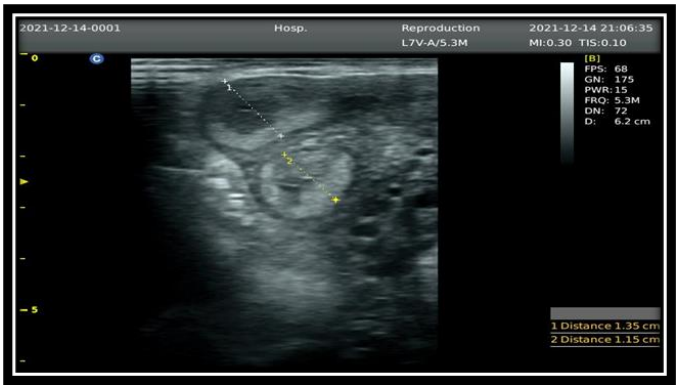

Figure 9. Ultrasound image of uterine horns show hypo echogenic due to recent ovarian activity in post-partum anestrus using 5 MHz trans rectal transducer

Figure 10. Ultrasound images of ovary showed persistent corpus luteum appears more hyper echoic than follicle surrounding it in ovary using a 5 MHz trans rectal transducer

Figure 11. Ultrasound image of ovary show dense theca tissue more echoic than ovary and contain a central cavity in corpus luteum using a 5 MHz trans rectal transducer

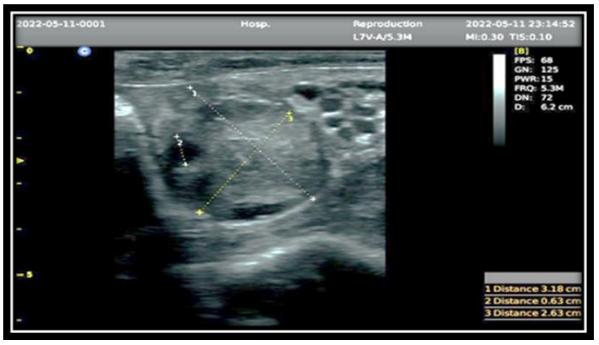

Figure 12. Ultrasound image of ovary show Para ovarian cysts at 2 o'clock of image using a 5 MHz trans rectal transducer

As for the silent estrus, all the signs were similar to the normal cases in terms of the presence of mature and secondary follicles (Figure 13 A) and the absence of abnormal structures with normal gray clear echoic uterine layers with lumen longitudinally section (Figure 13 B).

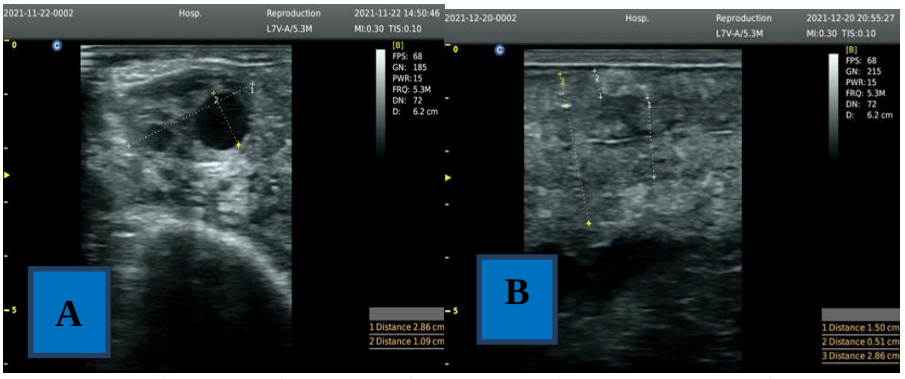

Figure 13. *A*- Ultrasound images show normal structures on the ovary with mature follicle, B- longitudinal section of ultrasound images show uterine horns iso gray echoic layers 1-indomaterium, 2-myomaterium, 3-perimaterium using a 5 MHz trans rectal transducer

Table 4
Characteristic features for the reproductive system in anestrus cases by ultrasonographical examination

Diagnosed causes		Ovaries	Uterus
True anestrus	Inactive ovaries	Smooth gray iso-echoic small ovaries (1.9-2.9cm), without structures with a high echoic border (Figure 2)	Smooth gray echogenic uterine horns with unclear borders rings in transvers section (Figure 3)
	Uterine inflammation	--------	Dense and hyper echoic inflammatory fluid, with thick uterine lining (0.59 cm) (Figure 4)
	Adhesions	Dorsal adhesion appear like hyper echoic zoon adjacent the ovary ventrally (Figure 5)	----------
	Obstructions	Fluid accumulation inside oviduct appear hypo echoic, diameter 0.20-0.30 cm with length 1.26 cm (Figure 6, 7)	---------
Postpartum anestrus	Luteal cyst	Follicle like structure (2.88cm-2.90cm) that appear hyper echogenic with dense theca tissue more echoic than ovary (Figure 8)	Uterine horns are less echogenic with clear gray ring in transvers section (Figure 9)
	Inactive ovaries	Small gray ovaries and iso echoic than the surrounding tissue	Uterine horns are clear hyper echogenic than another tissue in transvers section
	Uterine Inflammation	Accompanied with luteal cyst or persistent corpus luteum or cystic corpus luteum	Hypo echoic inflammatory fluid, the lining of the uterus is take 0.35 cm
	Persistent corpus luteum	Dense theca tissue (1.15cm-1.75cm) more echoic than ovarian echogenicity (Figure 10)	Uterine horns are hyper echogenic and clear gray ring in transvers section
	Cystic corpus luteum	Follicle like structure (1.33cm) more hyper echoic than follicle and contain a central cavity (Figure 11)	Uterine horns are hyper echogenic and clear gray ring in transvers section
	Para ovarian cyst	Hypo echoic small vesicles similar to a bunch of grapes outside the ovary accompanied with luteal cyst (Figure 12)	Uterine horns are smooth gray echogenic and unclear borders rings in transvers section
	Silent estrus	Normal structures on the ovary with mature and secondary follicles (Figure 13 A)	Uterine horns are gray clear echoic uterine layers with lumen in longitudinal section (Figure 13 B)

Our results indicated that most of the cases of true anestrus were inactive ovaries as well as ovulatory follicles which formed 100% from true anestrus cases, which is in agreement with many studies that dealt with a true anestrus (Abraham, 2017; Dutta et al., 2019 and Kumar et al., 2020). The reasons are attributed to the fact that most cases of true anestrus came accompany with the hot months (June till August) or due to nutritional deficiency and decreasing in quality and quantity of pasture which followed by a significant decrease in the gonadotropin (FSH and LH) which are responsible for follicular development and estrus behavior (Garba et al., 2021).Heat stress can disrupt development and function of the oocyte through its effect on follicular growth which involve changes at the level of the follicle or the secretion of the pituitary hormones that control development of the follicle (De Rensis et al., 2021) or its effect on steroid secretion by reduced plasma concentrations of estradiol and lowered follicular estradiol concentration, aromatase activity and LH receptor level, and delayed ovulation (Wolfenson and Roth, 2019).

The results also clarified the occurrence of uterine inflammation, adhesions and oviductal obstruction in true anestrus cases and reached into chronic stage of the pathological condition. The presence of infection after parturition and its persistence for long time with the absence of hormonal activity play an important role for the chronic uterine infection which may be progressed to adhesions and oviductal obstruction (Ali et al., 2021). The study showed the efficiency of the ultrasound device in diagnosing many cases which are difficult to diagnose clinically (Channo et al., 2022).

The current study showed that there was an increase in the number of postpartum anestrus cases in the cold and temperate months (from December till May), which is agreed with (Munged et al., 2019 and Ambrose, 2021). High percentage of parturitions (especially in Iraq) is usually occurring between September and December and after parturition the reproduction will pass to a quiescent period especially in suckling or intensively milked animals (Munged et al., 2019 and Jawad et al., 2020). This acyclic period is generally considered as the postpartum anestrus period. The postpartum period is regarded an important period in the reproductive life of animals because of its effect on subsequent fertility. Abnormal puerperium or any extension in this period will lead to entrance to abnormal postpartum anestrus. The prolongation of the postpartum period and the entry of the animals in to postpartum anestrus are usually will occur in the months which following the parturition season (Vijayalakshmy et al., 2020) which is an agreement with our results about the increase in the incidence of postpartum anestrus in the cold and temperate months of the year.

Our results revealed a clear decline in anestrus cases during the autumn months (September till November) which are agreed with (Gautam, 2020). This study showed the temperate climate is usually associated with disappearance of stress factors which join with an increase in the quality and quantity of feed and pasture during this period that associated with an improvement in the hormonal performance of cows and subsequent increase in the appearance of estrus behavior, and at the same time increasing in the pregnancy rate for these months as shown in (Wolfenson and Roth, 2019 and Fernandez et al., 2020). The current study identified the most important reasons that led to postpartum anestrus. The

main causes for postpartum anestrus were luteal activities like luteal cyst, persistent corpus luteum and cystic corpus luteum which agreed with (Taher et al., 2019; Hamouda et al., 2020 and Ali et al., 2021). In our results the luteal cyst formed 60% from the postpartum anestrus cases. Luteal cyst is regarded the main causes which disrupt the normal endocrine events of the estrous cycle (Mimoune et al., 2021). Many factors play an important role as a predisposing factor for luteal cyst include metabolic diseases, negative energy balance, high productivity, retained placenta, dystocia, stress and genetics (Abdisa, 2018). These factors as well as nutritional deficiency in highly yield dairy cows contribute in decline the gonadotropin LH by the effect of prolactin. Prolactin may act directly or indirectly to suppress GnRH secretion and the chance of luteal cyst formation (Auriemma et al., 2020).

The persistent corpus luteum and cystic corpus luteum in our results formed more than 20% from the postpartum anestrus cases. The corpus luteum that forms after ovulation is usually functional for 11 to 14 days in the non-pregnant cows. Luteolysis, or destruction of the corpus luteum, occurs as a result of prostaglandin F2α release from the endometrium. Corpus luteum that fails to regress at the normal time post ovulation is considered to be pathologically persistent. Uterine infections after parturition including pyometra or high milk production especially in early postpartum period play a role in reduction of prostaglandin F2α and the persistence will occur (Parmar et al., 2016 ; Mushonga et al., 2017).

In addition to the luteal activity, the inactive ovaries and anovulatory follicles were also played role as a reason for postpartum anestrus. According to our results the inactive ovaries occurred within postpartum anestrus cases which is agreed within (Orihuela and Galina 2019 and Long et al., 2021) which they showed this condition was most frequently in highly yield dairy cows. Our hormonal results showed a significant increase in the prolactin and at the same time a significant decrease for both FSH and LH. Prolactin may act directly on GnRH neurons to suppress GnRH secretion, or may be indirect through other afferent pathways via other neurons influencing GnRH release (Suhaimi et al., 2018) and also inhibiting FSH and LH that trigger ovulation and allow follicles to develop and mature (Berry et al., 2016).

The study also explained the presence of silent estrus cases within postpartum anestrus cases and the efficiency of the ultrasound device to diagnose these cases which are didn't differ from others normal estrus cases. Sub estrus or silent estrus in cattle is defined as the lack of behavioral estrus symptoms although the genital organs undergo normal cyclical changes. Incidence of silent heat varies from 10-40% during postpartum period (Ahmed et al., 2019). Silent estrus is usually occurring during hormonal disturbances when not enough progesterone is being produced. Progesterone acts along with estrogen to get a visual signs of estrus in cows ore heifers (Sammad et al., 2020).

The hormonal study for true and postpartum anestrus cases determined the levels of estrogen, progesterone, FSH, LH and prolactin which confirmed the results of determining the causes of anestrus by using ultrasound. The study showed a significant decrease of estrogen in all cases of true and postpartum

anestrus cases as well as a significant decrease in both FSH and LH in inactive ovaries cases. The reasons for the failure of normal ovarian activity may be insufficient release or production of gonadotropins to induce follicular development and maturation or it may ereflect the failure of the ovaries to respond to gonadotropins (Laksmi et al., 2019 and Kadhim et al., 2020). The major cause for this condition is a low level of nutritional intake which prolonged the period from parturition to first estrus (Laksmi et al., 2019).

The study explained the efficiency of the ultrasound device in determining and distinguishing the main signs for each causes of true or post-partum anestrus. Its efficiency was revealed through the absence of structures in the ovaries or small anovulatory follicles in case of inactive ovaries. Our ultrasonographical evaluation for inactive ovaries showed smooth gray iso-echoic small ovaries without structures with a high echoic border that agreed with (Yimer et al., 2018). Also our evaluation determined the presence of luteinizing activity (luteal cyst, persistent corpus luteum and cystic corpus luteum). The luteal cyst appeared as a follicle like structure (2.88cm-2.90cm) which hyper echogenic with dense theca tissue more echoic than ovary. While the presence of corpus luteum appeared as a dense theca tissue (1.15cm-1.75cm) which appeared more echoic than ovaries and contain a central cavity for cystic corpus luteum as shown by (Mimoune et al., 2021). Many researchers showed the efficiency of ultrasonography more than rectal palpation for reproductive control of cattle, particularly in dairy farms.

The high sensitivity for detecting ovarian follicles, corpora luteum or cystic structures, makes it useful for determining the stage of the estrus cycle of cow or diagnosing ovarian pathologies (Jyoti et al., 2019). The results of current study proved the efficiency of ultrasonography for diagnosing the oviductal obstruction and adhesions as showed by (Sofi and Singh, 2018). Ultrasonography makes it possible to diagnose oviductal obstruction through determine the fluid accumulation inside the oviduct which occurred after obstruction as a result of endometrial inflammation extension toward the utero-tubal junction (Madhusudhan et at., 2017) and its efficiency to determine the hyper echoic zoon adjacent the ovary in case of ovarobursal adhesions (Sofi and Singh, 2018). Our ultrasonographical evaluation revealed the distinctive role of ultrasonography in determining the uterine inflammation and infection which appeared as a dense and hyper echoic inflammatory fluid inside uterus with thick uterine lining in true anestrus and hypo echoic inflammatory fluid with thin uterine lining for postpartum anestrus as showed by (Sofi and Singh, 2018). Inflammations of the uterus in cows like puerperal metritis, clinical endometritis, subclinical endometritis and pyometra represents the most important causes of infertility and anestrus in dairy cows (Adnane et al., 2017).

Conclusion

- Inadequate nutrition and hot climate play an important role for the incidence of anestrus in cows
- In general the period of open days in cows in south of Iraq is somewhat long
- The efficiency of ultrasonography for detection ovarobursal adhesions and oviductal obstructions in anestrus cows

- Ultrasonography has an efficient method to detect inactive ovaries, luteal cyst, persistent corpus luteum and cystic corpus luteum
- Ultrasonography can detect the uterine content (fluid or pus) and uterine infection from the uterine lining
- Ultrasonography can easily diagnose the cases of silent estrus from anestrus cases

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