

## **Cryptorchidism in West Algerian Sheep. “Clinical and Histopathological Follow Up”**

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### **Abstract**

This paper describes features of a study of different aspects of a case of bilateral cryptorchid in rams one of the local Algerian breeds “Rembi rams”. A total of 221 cryptorchid testis (49 unilateral and 86 bilateral) were recognized in 135 animals post-slaughter at two abattoirs in the west of Algeria. One case of bilateral cryptorchid identified in Tiaret abattoir house been studied in detail in this study. It was based on macroscopically and histological description. Clinically, the retained testes were ascertained through inspection and physical palpation.

The most cryptorchid testes examined are smaller and farther than scrotal testis and stop in abdominal location. The histological examination showed much reduced with diminished and fibrous interstitial tissue leading to spermatogenesis loss.

In addition to those clinical and histological observed results observed on retained testes, other investigations will be carried on the scrotal testes for comparison.

**Keywords:** Sheep; Cryptorchidism; Abattoir; Survey; Seminiferous Tubules; Retained Testis

### **Introduction**

Cryptorchidism is a developmental abnormality in which one or both testes fail to descent from abdominal cavity into the scrotum [1,2]. Typically, cryptorchidism is detected at birth or shortly thereafter. The retained testicle may be located at any point along the normal path of descent (abdominal or inguinal cavity) or it may divert to an ectopic location. This abnormality is performed by various approaches [3,4]. The diagnosis of this abnormality is primarily based on clinical appearance and it is often supplemented by a review histological in order to assess the degree of damage to the retained testicle [5]. Gouletsou., *et al.* (2015) demonstrated the utility of abdominal ultrasonography as an adjunct to clinical examination in cryptorchid diagnosis in sheep [6]. Cryptorchidism is rare in ruminants and this abnormality is sometimes encountered. Nevertheless, it is an important factor of infertility in sheep and their occurrence leads to economic loss and decreased selection potential of male breeding stock. Bulk of published works on cryptorchidism has been concerned with the descriptive clinical changes in both the retained testes [7].

To our knowledge, no descriptive studies of cryptorchidism cases have not so far carried out in Algeria sheep farming. This may provide further information on the macroscopic and microscopic description of bilateral cryptorchid testes.

## **Materials and Methods**

### **Location**

The study took place at two slaughterhouses in the west of Algeria (Tiaret and Tissemsilt areas). Testes of slaughtered 4326 rams from local Algerian breed were examined in abattoir for detecting testicular pathological changes.

### **Experimental animals**

Our intervention at the slaughterhouse level is to gather information about the rams examined and especially those that carry cases of cryptorchidism. Slaughter observations were conducted regularly twice a week throughout the study period. The identified abnormalities were detected and examined before and after slaughter so that the pathology inspection was confirmed in post-mortem examination (Figure 1).



**Figure 1:** Post mortem examinations of cryptorchidism in sheep.

At each observation all slaughtered rams were checked for the condition of their testes by a careful inspection and palpation.

In order to identify the anatomical and topographical changes, the anomalies were identified according to a number of criteria namely size, shape, position and number of cryptorchid testicles. The location of the testicles of cryptorchid animals in the abdominal or inguinal region was confirmed after the exploration of the abdominal region and the introduction of the fingers into the inguinal canal for the search testicle that can be stopped along its path.

The most anatomical site of the testes was recorded as abdominal and was photographed *in situ*. The rams in which one or both testes were absent were marked and further examined at the point of evisceration.

That study was supported by an abattoir investigation in which anatomical and histological features of bilateral cryptorchid testes. The present case was collected from Tiaret slaughterhouse and post mortem examination located near from the Institute of Veterinary Sciences. The scrotal wall was incised and the testes were removed and examined further.

Pathological examination was performed macroscopically to determine the presence of lesions and the clinical findings were recorded. The testes of the bilateral cryptorchid case were fixed in 10% formalin routinely processed and embedded in paraffin wax and transported immediately to the histology laboratory of the Institute of Veterinary Sciences for later histological examination. Section cut at 5 µm thickness were stained with Hematoxylin and Eosin for microscopic examination.

**Statistical analysis**

The registered testicular pathologies underwent a statistical comparative study to determine the frequency of the dominant abnormality on the one hand and the number of testicles assigned, i.e. a unilateral or bilateral pathology on the other hand.

The proportions of unilateral and bilateral anomalies in cases of cryptorchidism and hypoplasia were calculated by the chi square test.

**Results**

Details of the cryptorchid animals detected in the two abattoir surveys are described below.

In a survey of 4326 rams examined during the slaughter house visits a total of 241 abnormalities of the reproductive tract of male sheep were detected. The results are summarized in table 1.

Slaughterhouses	Cryptorchidism			Animals		Abnormalities
	Incidence	Unilateral	Bilateral	Total	Examined	Identified
Tiaret Slaughterhouse	41	67	108	2750	195	4 <sup>a</sup> 55 <sup>b</sup>
Tissemssilt Slaughterhouse	8	19	27	1576	46	2 <sup>a</sup> 59 <sup>b</sup>
All Slaughterhouses	49 (36%)	86 (64%)	135	4326	241	3 <sup>a</sup> 10 <sup>b</sup>

**Table 1:** Incidence and distribution of unilateral or bilateral cryptorchidism in Rembi rams at Algeria abattoirs.

*a:* Percentage of each abnormality in relation to the total number of examined animals.

*b:* Percentage of each abnormality in relation to the total number of the abnormalities.

Cryptorchidism was detected in 135 animals (49 cases were unilateral and 86 bilateral, giving a total of 221 cryptorchid testes. Several of the cases had been identified, and retained for examination.

The proportions of cryptorchid animals varied between the numbers of retained testis with significant difference (Figure 2). The sizes and shapes of cryptorchid testes varied somewhat. Most abdominal testes were generally smaller and firmer than those present in the scrotum and almost invariably of globoid or spheroidal shape (Figure 3). Most epididymis associated with cryptorchid testes had an abnormal appearance.



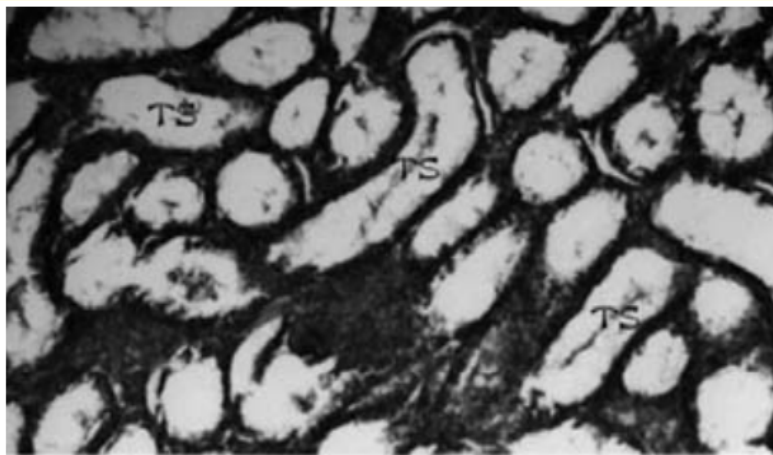
**Figure 2:** Case of bilateral cryptorchidism encountered in Rembi breed rams. (Before the abdominal exploration).



**Figure 3:** Case of bilateral cryptorchidism encountered in Rembi-breed rams (After the abdominal exploration).

An abdominal testis is within the abdominal cavity, typically between the kidney and bladder or near the internal inguinal ring. With reduction in testicular size, epididymis appeared relatively enlarged; in extreme cases the testis was so small that they were obscured by the epididymis and difficult to identify without histological confirmation of the presence of testicular tissue. Epididymal abnormalities included loss of testicular attachment, and even complete separation, of parts of the epididymis from the testis.

Histological examination of bilateral cryptorchid testes case showed very small seminiferous diameter tubules with little developed spermatogenic cells (Figure 4) and generally reduced with a seminal epithelium reduced to a single layer where only well-apparent Sertoli cells were noted with their nuclei (Figure 5). The stages of spermatogenesis did not exist and the light was narrow and empty. Interstitial tissue exists with Leydig cells immersed in a cluster of fibrous tissues (Figure 5).



**Figure 4:** Typical microscopic appearance of cryptorchid testis in Rembi ram. (Coloration Hematoxyline-Eosine, x 100). Seminiferous tubules are small and there is no spermatogenic activity; interstitial Leydig cells are normal but appear relatively increased.



**Figure 5:** Typical microscopic appearance of cryptorchid testis in Rembi ram. (Haematoxylin and Eosin x 500). CS: Sertoli Cellule.

## Discussion

Testicular congenital abnormalities are one of the leading causes of infertility in rams [3,8]. Estimating the prevalence of various genital abnormalities of rams of different breeds has been the subject of several studies often carried out in herds. However, few post-mortem studies (at the slaughterhouse) have been carried out.

An incidence of genital pathologies ranging from 10 to 20% in mainly Merino-bred rams examined in slaughterhouses in Australia [9]. Regassa, *et al.* (2003) reported 31.8% of pathologies reported at slaughterhouses of which testicular atrophy and epididymitis' were the most dominant [8].

The morphological and histological changes of ram's testis are few studied compared to other pets particularly for sheep living in areas where extensive farming conditions predominates and where nutritional and sanitary conditions are adverse. Bruere and West, (1993) considered that the majority of genital abnormalities in rams are easily detected by clinical examination [10].

Out of a total of 4326 rams examined, 241 (5.5%) presented a testicular abnormality, the results of our previous studies were based only on a macroscopic identification of the different conditions of the ram's genital tract in comparison with other work done elsewhere that is supplemented by a para-clinical examination.

The detection of cryptorchid animals amongst mature rams highlights the importance of proper clinical examination of rams prior to use as breeding sires. The diagnosis of this abnormality in sheep was ascertained generally through physical palpation. Grossly; the retained cryptorchid testes were smaller in size and were positioned at intraabdominal region, posterior to the kidneys in majority of the cases. Cryptorchidism has been reported by many authors [4,8,11]. The incidence of cryptorchidism among rams is approximately 1% from studies in the UK and USA [4,12,13].

However, few of the overseas surveys have differentiated between animals of different ages from lambs to rams. A roughly similar incidence of cryptorchidism has been described in some previous reports in Algeria so it is among the more common congenital abnormalities reported in surveys of reproductive tract abnormalities in Rembi sheep followed by Hypoplasia/atrophy [5]. A much higher incidence of cryptorchidism has been reported in ram lambs of the North Ronaldsay breed [4]. the recorded incidence in those animals ranged between 2.4% to 18.0% (mean 7.4%).

It has been suggested that cryptorchidism and testicular hypoplasia was the most pathology occurred might have the same hereditary basis [14].

The low rate of cryptorchidism reported by the majority of authors may have as causes the early testicular descent in ram and the congenital and/or hereditary origin of this anomaly [14,15]. In that study Cryptorchidism may be unilateral or bilateral, although bilateral cryptorchidism is more frequent and the right testis was more commonly affected than the left. According to the bibliography, among unilateral cryptorchids, the right testicle is retained in the abdomen in approximately 80% to 90% of affected animals [1,4]. The high proportion of bilateral cryptorchidism observed in our study can be explained by the fact that breeders easily detect this type of cryptorchidism and eliminate immediately all affected animals. According to Amann and Veeramachaneni, (2007), the etiology of cryptorchidism is a complex interaction of genetic, anatomic and other acquired factors such as fetal exposure to some endocrine disruptors [1]. Whereas in the case of unilateral cryptorchidism, some breeders prefer to keep these animals if necessary because their slightly reduced fertility does not have a strong impact on the fertility of the herd [5]. Histological, because the influence of abdominal temperature, the somniferous tubules of the cryptorchid testis were hypoplasia with poorly differentiated germinal epithelium with or without central hallow and in some testes. The tubules were separated by expanded areas of connective tissue. The cryptorchid testis fails to develop to spermatozoa. The inter tubular leydig are not affected and to synthesize and secrete androgens. According to Amann and Veeramachaneni, (2007), post

pubertal abnormalities associated with cryptorchidism (e.g. testis tumors, atypical concentrations of reproductive hormones, altered spermatogenesis in scrotal testis,) are not caused by elevated temperature of an abdominal location but as a delayed manifestation of testis digenesis [1]. The occurrence of epididymal abnormalities in association with cryptorchid testes has not been described previously in detail in sheep or most other domestic animals; one exception being dogs [2] in which epididymal detachment has been reported in some cases. Cryptorchidism and Hypoplasia were often observed and encountered in the Algeria rams. Although it occurs at a low frequency, it cannot be considered a rare condition among the large number of sheep in the national flock (more than 26 million).

## **Conclusion**

The true incidence of cryptorchidism in male sheep in national flocks, in the Algeria and elsewhere may not reflect these findings since all surveys are likely to have been biased in various ways as a result of sources of animals and criteria for inclusion in their studies.

This low rate shows that these types of abnormalities identified in our study are not one of the major causes of infertility in the Rembi sheep herd, which is mainly located in these regions. In farms, it is likely that the frequency of testicular abnormalities is even lower.

Of the other hand, Cryptorchidism is considered to have hereditary attribute, therefore it is recommended that animals with cryptorchidism should not be used in breeding to forestall increasing prevalence of cryptorchidism in sheep. Animals affected should be removed from our farms because of sub fertility.

## **Significance Statement**

This study discovered that the cryptorchidism is the frequent abnormality among the all genital pathologies encountered in the present study. This will help us to identify on the one hand the various genital pathologies encountered in Algerian sheep farming and on the other hand to apply the necessary measures for the good management of our breeding. So, others investigations will be carried in future works.

## **Competing Interests**

The authors declare that they have no competing of interest.

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