Trop. Anim. Hlth Prod. (1985) 17, 57–62

ABSCESSES AND CASEOUS LYMPHADENITIS IN GOATS IN TROPICAL SEMI-ARID NORTH-EAST BRAZIL

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SUMMARY

This study reports the incidence of abscesses in relation to Corynebacterium pseudotuberculosis *infection in goats in north-east Brazil. Among 656 goats examined periodically over almost two years 41·6% were found with superficially palpable abscesses. Most of the infected areas were in the anterior half of the body in front of the pre-scapular region; the inguinal region formed the other prominent area. Among 486 dead or slaughtered goats, 56 (11·5%) revealed abscesses in the internal organs. Lungs and epididymis were affected most, liver, spleen, udder and lateropharyngeal nodes were next in order and kidneys and mediastinal nodes were least affected. Thus the overall incidence of external and internal abscesses was 28·8%; of all the abscesses 27·7% were due to* C. pseudotuberculosis *and the rest due to infections of* Corynebacterium pyogenes *and several species of streptococci or staphylococci. The growth of* C. pseudotuberculosis*-infected and non-infected goats was of the same order and it seems that caseous lymphadentitis is not the cause of much financial loss in north-east Brazil but in view of its high incidence remedial measures should be considered necessary in regions where the goat meat industry is likely to become more intensive and important.*

INTRODUCTION

Superficial abscesses are widely present in goats and sheep in Brazil but very little information is available (Costa Filho, 1974; Silva and Silva, 1982). The abscesses are generally believed to be due to *Corynebacterium pseudotuberculosis* causing caseous lymphadenitis. This paper presents some results of a survey conducted in Ceará state of this region.

MATERIALS AND METHODS

Between November 1980 and December 1982, 656 goats were examined in the following localities of Ceará state: Sobral, Tauá, Quixadá, Senador Sá, Massapê and Granja. These localities like so many others in the state traditionally maintain flocks of goats and hairy to semi-hairy sheep and are in the semi-arid region close to the equator. The goats belonged to both sexes and were of varying ages but excluded young animals of less than a year old. Externally visible abscesses were palpated to identify their state – early, fully formed or cicatrised; all animals were examined at periodic intervals and all positive animals were surgically treated. An animal classified as positive once did not enter the list of positive animals again. An examination was also conducted of 191 goats that were sent for post-mortem and 295 goats that were slaughtered for presence or absence of abscesses in the internal organs.

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Samples of abscess contents (pus) were obtained in each positive case for bacteriological examination. Cultural examination comprised aerobic incubation at 37°C for 96 h on blood agar; bacterial colonies were identified by standard techniques (Merchant and Packer, 1975).

A group of 54 goats consisting of 26 with positively identified *C. pseudotuberculosis* abscesses and 28 negative goats was periodically weighed every 28 days for almost a year at Sobral. The negative goats were completely free of any kind of abscesses either clinically during the year or at necropsy at the end of the period. The animals were 12 to 15 months of age at the beginning, the ages being uniformally distributed in the two groups. Three analyses of variance were carried out: on the body weights as the basic data, on monthly body weight gains and on the overall gain during the year calculated as the difference between the mean body weight of the last two months and the mean of the first two months.

RESULTS

Of the 656 goats that were examined periodically over two years 273 were found with externally palpable abscesses at one time or another (Table I). Another 486 goats were examined post-mortem or immediately after slaughter and the results on the incidence of abscesses are presented in Table II. Of the total of 1,142 goats, the number of animals examined in each calendar month over the two-year period and the abscesses encountered are listed in Table III. Of the 329 animals examined for bacteria in their abscesses 91 (27·7%) yielded *C. pseudotuberculosis*; of these 35 (38%) were diagnosed in 1981 and 56 (62%) in 1982. The remaining abscesses contained one or other of the following organisms: *C. pyogenes, Streptococcus* spp., *Staphylococcus aureus* and *Staph. epidermidis.*

In Table IV are presented the mean body weights of goats belonging to *C. pseudotuberculosis* infection positive and negative goats. In the beginning the mean body weight of the positive group was slightly lower than that of the negative group. This difference was maintained throughout the year and hence gave a significant difference in an analysis of variance in Table V. However, it was considered necessary to study the growth of animals in the two groups. The per month gain in body weight was then analysed and no difference between the groups was observed; the overall increase in the body weights during the period of one year was also similar.

TABLE I

Distribution of externally palpable abscesses among 656 goats examined periodically for two years in north-east Brazil

Body regions where lymph nodes were found affected	Number of animals	Percentage of total positive cases	Percentage of total goats examined
Pre-scapular	98	35·9	14·94
Parotid	66	24·2	11·06
Submandibular	25	9·1	3·81
Cervical	12	4·4	1·83
Anterior thigh	39	14·3	5·95
Supramammary			
Testicular	33	12·1	5·03
Total	273	100·0	41·62

TABLE II

Distribution of abscesses found among 486 slaughtered or dead goats

Organs	Number of animals	Percentage of total positive goats	Percentage of total slaughtered goats
Lungs	14	25·0	2·88
Liver	6	10·7	1·23
Spleen	4	7·1	0·82
Kidneys	2	3·6	0·41
Epididymis	13	23·2	2·68
Udder	7	12·5	1·44
Lateral pharyngeal nodes	8	14·3	1·65
Mediastinal nodes	2	3·6	0·41
Total	56	100·0	11·52

All the 56 goats with internal abscesses also had superficial abscesses but no records were kept of the superficial abscesses in the other goats that were slaughtered.

TABLE III

Monthly distribution of new animals identified with external or internal abscesses in north-east Brazil

Months	No. of animals examined	No. of animals with abscesses
January	416	45
February	642	10
March	666	11
April	666	38
May	642	50
June	416	25
July	666	38
August	642	11
September	666	12
October	666	22
November	242	33
December	416	24

The number of animals with abscesses represents only the new cases with abscesses avoiding those that were already counted before.

DISCUSSION

Caseous lymphadenitis caused by *C. pseudotuberculosis* is a widespread disease of goats and sheep (Nelson, 1980; Burrell, 1981). In addition to causing substantial losses due to rejection of carcasses in countries where the sheep/goat meat industry is important (Wroth and Suiter, 1978) it may cause losses due to poorer quality of pelts for export market in countries like Brazil (Figueiredo, Shelton and Pant, 1982). The results of this experiment show that a large number of goats in north-east Brazil suffer from abscesses at some time in their lives. In the present study a large number of kids of up to one year of age were also examined but none of them had any superficial abscesses. Moura Costa (pers. comm.) examined kids in the neighbouring Bahia state where he found abscesses in kids of ages between four and nine months. The incidence of abscesses was

TABLE IV

Growth of Corynebacterium pseudotuberculosis *infected and non-infected goats in north-east Brazil*

Months	Body weight in kg (s.e.)	
	Corynebacterium positive group (26 goats)	*Corynebacterium* negative group (28 goats)
September	22·80 (1·99)	23·96 (2·76)
October	23·36 (2·08)	24·44 (2·88)
November	24·26 (2·59)	25·23 (3·02)
December	25·00 (2·91)	26·17 (3·25)
January	22·92 (2·36)	24·40 (3·85)
February	24·17 (3·69)	24·97 (3·45)
March	27·57 (3·93)	28·24 (3·51)
April	27·13 (4·74)	27·27 (4·09)
May	28·16 (3·88)	29·13 (3·95)
June	30·15 (4·16)	30·90 (3·85)
July	33·04 (4·20)	34·32 (4·20)
August	35·48 (4·89)	37·16 (4·24)

Infected goats represent goats with superficially visible abscesses positively identified as due to *C. pseudotuberculosis*. The non-infected goats did not have any abscesses throughout the period of observations and had no internal abscesses when examined at the end of the year.

TABLE V

Analysis of variance of body weights and growth of caseous lymphadenitis positive and negative goats

Source of Variation	Body weights of goats in kg		Monthly gains in body weight		Overall gain (mean of last two months minus mean of first two months)	
	d.f.	MS	d.f.	MS	d.f.	MS
Positive or negative groups (G)	1	166·35[2]	1	0·0114[1]	1	1·4446[1]
Months (M)	11	939·55[2]	10	133·5185[2]	—	—
G×M	11	2·18[1]	10	2·4004[1]	—	—
Residual	624	13·01	572	2·6966	52	10·1688

[1]Not significant ($P>0·05$).
[2]Highly significant ($P<0·01$).
The analysis pertains to the data presented in Table IV.

28·8% which is much higher than reported by Addo and Eid (1978) in Nigeria in sheep and goats (4·2%) and by Ashfaq and Campbell (1979) in goats in the USA (8·07%). In Brazil reliable data are not available for comparison. However, the higher incidence may be due to the type of pasture (caatinga) which is characterised by thorny bushes and small trees. The pattern of distribution of abscesses in the body (mainly in the anterior region) and the fact that a number of bacteria were found involved in developing abscesses indicates that infection through skin may be important in goats of north-east Brazil. A lower incidence of

pulmonary and mediastinal abscesses than in cutaneous nodes and their absence in mesentric nodes suggests that the respiratory and digestive tracts are a less important route of infection. Of the bacteria isolated only in 27·7% of cases were the abscesses due to *C. pseudotuberculosis* which is a much lower involvement than the 70% reported by Ashfaq and Campbell (1979). Addo (1978) on the other hand encountered 29 of 149 samples with *C. pseudotuberculosis* infection in a survey of cattle, sheep and goats.

It was not easy to explain the differences in growth of goats. If only weights are taken it would seem that goats with *C. pseudotuberculosis* infection had a consistent disadvantage causing the body weights to be lower than those of non-infected goats. However, it is possible that in small samples of 26 and 28 goats an initial difference was purely due to chance. If the disease was really a handicap the normal growth of goats should have been disturbed. This did not happen and infected and non-infected goats grew in identical manner over a period of one year and their gains in body weights were almost identical with similar seasonal variations as are expected in relation to rainfall in this area (Riera, Simplício and Pant, 1982). Apart from growth of goats the abscesses may cause skin defects leading to lower quality of processed pelts (Figueiredo *et al*, 1982). However, one recently concluded study here has shown that abscesses are not an important cause of defects of skins as they are generally on the periphery of the processed skin. Thus the economic value attached to this disease in north-east Brazil may be lower than has been assumed on the basis of publications elsewhere. However, for the meat processing industry carcasses with abscesses may be the cause of significant loss and hence due attention to controlling caseous lymphadentitis may be necessary in areas where the goat meat industry is likely to become intensive with export potential.

ACKNOWLEDGEMENTS

We are grateful to Dr J. A. Hage de Silva and Dr Orlando C. Ribeiro for their help in identification of bacteria. Thanks are also due to Mr José Airton Pereira for his help in field work.

Accepted for publication March 1984

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ABCES ET LYMPHADENITES CASEEUSES CHEZ LES CAPRINS EN REGION TROPICALE SEMI-ARIDE DU NORD-EST BRESILIEN

Résumé—Parmi 656 caprins examinés périodiquement pendant presque deux ans, 41,6 p. 100 ont été trouvés porteurs d'abcès palpables superficiels. Dans la plupart des cas, la zone infectée se trouvait dans la moitié antérieure du corps, à l'avant de la région pré-scapulaire. La région inguinale constituait la deuxième zone la plus infectée. Sur 486 animaux morts ou abattus 56 (11,5 p. 100) ont montré des abcès internes affectant en premier lieu les poumons et l'épididyme. Le foie, la rate la vessie, les ganglions pharyngienslatéraux venaient ensuite dans l'ordre. Les ganglions rénaux et médiastinaux étaient les moins affectés. La incidence des abcesses externes et internes a étè de 28,8 p. 100.Globalement, 27,7 p. 100 des abcès étaient dus à *C. pseudotuberculosis*. le reste à *C. pyogenes* et à quelques espèces de staphylocoques et streptocoques. La croissance des caprins infectés ou non par *C. pseudotuberculosis* était à peu près identique et il semble que la lymphadénite caséeuse n'entraîne pas beaucoup de pertes financières dans le Nord-Est brésilien mais étant donné sa fréquence élevée, des mesures curatives devraient être considérées comme nécessaires dans les régions où l'industrie de la viande de chèvre a des chances de devenir plus intensive et plus importante.

ABSCESOS Y LINFADENITIS CASEOSA EN CABRAS DEL NORDESTE SEMIARIDO TROPICAL DE BRASIL

Resumen—Este estudio informa sobre la incidencia de abscesos en cabras del nordeste de Brasil. Se examinaron 656 cabras periódicamente durante dos años, de las cuales 41·6% se encontraron con abscesos superficiales palpables. Las áreas infectadas correspondieron a la mitad anterior del cuerpo, frente a la región pre-escapular y a la región inguinal. De 486 cabras muertas o faenadas, 56 (11·5%) revelaron abscesos en los órganos internos. De estos, los mas afectados, en orden descendente fueron: pulmones, epididimos, hígado, bazo, ubre, nódulos linfáticos faríngeos, riñones y nódulos linfáticos mediastínicos. La incidencia general de abscesos externos e internos fue de 28·8%. De todos los abscesos 27·7% se debieron a *Corynebacterium pseudotuberculosis* y el resto a *C. pyogenes* y a especies de *Streptococcus* y *Staphylococcus*. El crecimiento de cabras infectadas y no infectadas con *C. pseudotuberculosis* fue similar, lo que sugiere que la linfadenitis caseosa no ocasiona muchas pérdidas económicas en el nordeste de Brasil pero en vista de su alta incidencia medidas de control deben ser consideradas en regiones donde la industria de carne caprina pueda llegar a ser mas intensiva e importante.

Announcement

Fourth Tropag Course on Recent Developments in Animal Nutrition and their Application to Tropical Countries

The Course will be held at the CTVM between August 26th and September 6th 1985 and covers all the major aspects of ruminant, pig and poultry nutrition and feeding in the tropics and is designed for advisers, consultants, lecturers, teachers and postgraduate students. For further details please write to Mr Richard Matthewman or Dr Denis Fielding at the CTVM.

Errata

The following misprints occurred in the November 1984 issue:

Page 198, line 8 "materials" should read "maternal".

Page 209, last line of the Summary should read "males (4·5%) as females (5·6%)".