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Goat Meat Production in Asia

Proceedings of a workshop
held in Tando Jam, Pakistan,
13-18 March 1988

Proceedings



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Abstract/Résumé/Resumen

Abstract: This publication presents the results of a workshop held in Tando Jam, Pakistan, 13–18 March 1988, that focused specifically on all aspects of goat meat production in Asia. The workshop addressed the factors affecting meat production (breeding, nutrition, reproduction, sex, management, animal health, and diseases), the nutritional value of goat meat, methods of slaughter, processing techniques, consumer preferences, and the national and international marketing of goats. The detailed discussions on these aspects were further highlighted by country case studies, prevailing situations, issues and policies, and potential for improving the prevailing patterns of production. An important session covered broader issues concerned with research and development, strategies for increasing production, and export potential, especially in Near East markets. These discussions enabled a definition of research and development priorities and the scope for increasing goat meat production.

Résumé: Cette publication fait le compte rendu d'un atelier tenu à Tando Jam, au Pakistan, du 13 au 18 mars 1988 et qui a porté sur tous les aspects de la production de la viande de chèvre en Asie. Il y a été question notamment des facteurs influant sur la production de la viande (sélection des espèces, nutrition, reproduction, sexe, gestion, santé animale et maladies), de la valeur nutritive de la viande de chèvre, des méthodes d'abattage, des techniques de transformation, des préférences des consommateurs et du marketing national et international des chèvres. En plus de discuter de ces questions en profondeur, les participants ont aussi abordé les points suivants : études de cas de certains pays, situations actuelles, enjeux et politiques, et possibilités d'améliorer les tendances actuelles de la production. Lors d'une séance importante, les participants se sont penchés sur des questions plus vastes concernant la recherche et le développement, les stratégies qui permettraient d'augmenter la production et les possibilités d'exportation, particulièrement vers les marchés du Proche-Orient. Ces discussions ont permis de définir des priorités en matière de recherche et de développement et de déterminer le potentiel de croissance de la production de la viande de chèvre.

Resumen: Esta publicación contiene los resultados de un taller celebrado en Tando Jam, Paquistán, del 13 al 18 de marzo de 1988, dedicado específicamente a todos los aspectos de la producción de carne de cabra en Asia. El taller estudió los factores que afectan la producción de carne de cabra (cruce, nutrición, reproducción, sexo, manejo, salud y enfermedades), el valor nutricional de la carne caprina, los métodos de sacrificio, las técnicas de procesamiento, las preferencias del consumidor y el mercado caprino nacional e internacional. Las discusiones detalladas sobre estos aspectos se vieron además enriquecidas con el potencial para mejorar los patrones prevalentes de producción. Una de las sesiones importantes cubrió los aspectos más amplios de investigación y desarrollo, estrategias para el aumento de la producción, potencial de exportación, especialmente en los mercados del cercano oriente. Las discusiones permitieron determinar las prioridades de investigación y desarrollo así como las posibilidades para aumentar la producción de carne caprina.

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Disease factors affecting goat meat production

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Abstract: *There is a variety of infectious diseases leading to abortion and embryonic losses in goats causing decreased meat production; the infectious organisms include Brucella melitensis, Chlamydia, Leptospira, and Mycoplasma. Neonatal losses as a result of Escherichia coli, foot-and-mouth disease, and coccidial infection are considered to be significant; the total losses caused by these infections are estimated at 20–30%. Insidious diseases such as Mycobacterium paratuberculosis and internal and external parasites influence growth, weakening and stunting the animal. Organs like the liver, lungs, heart, and brain are frequently rejected and condemned because of the invasion and migration of parasites in affected goats. Communicable diseases such as tuberculosis, brucellosis, chlamydiosis, hydatidosis, cysticercosis, and taeniasis adversely affect meat production, as do slow viruses like Visna/Maedi and Jaagsiekete. These diseases can be controlled. Regular testing for brucellosis and Johne's disease and the elimination of infected animals will help reduce the incidence of diseases. Besides clinical control of E. coli and coccidiosis, proper hygiene in the sheds and ensuring colostrum feeding are of paramount importance. The determination of worm load and the use of suitable drugs in infected goat flocks is the simplest way of controlling parasitic infestations. A field ELISA test can be introduced to successfully detect many diseases, particularly subclinical infection of M. paratuberculosis. It is essential that diseases affecting meat production in goats be combated, laboratory facilities be improved, and the availability of trained personnel and diagnostic antisera/antigen be increased.*

Résumé: *Il existe une grande variété de maladies infectieuses responsables de l'avortement et des pertes d'embryon chez les chèvres et, partant, d'une baisse de la productivité; mentionnons les infections à Brucella melitensis, à Chlamydia, à leptospires et à mycoplasmes. La mortalité néonatale causée par Escherichia coli, la fièvre aphteuse et les infections à coccidies est considérée comme élevée; ces infections, estime-t-on, présente un taux de 20 à 30 %. Les maladies insidieuses comme celle engendrée par Mycobacterium paratuberculosis ainsi que les parasites internes et externes contribuent à affaiblir l'animal et retarder sa croissance. Il est fréquent que les organes, comme le foie, les poumons, le coeur et la cervelle soient rejetés et condamnés parce que les parasites avaient infesté les chèvres malades. Les maladies transmissibles comme la tuberculose, la brucellose, la chlamydiase, l'hydatidose, la cysticercose et la téniasis nuisent à la production de viande de la même façon que les virus lents comme Visna/Maedi et Jaagsiekete. Il s'agit là toutefois de maladies que l'on peut vaincre. La régularité des tests pour dépister la brucellose et la maladie de Johne et l'élimination des bêtes infectées contribueront à réduire l'incidence de ces maladies. Outre le contrôle clinique de E. coli et de la coccidiose, le maintien d'une bonne hygiène dans les étables et l'ingestion du colostrum par le nouveau-né sont d'une extrême importance. La détermination du fardeau parasitaire et l'utilisation des bons médicaments pour traiter les troupeaux caprins infectés sont la meilleure façon d'enrayer les infestations parasitaires. L'utilisation place du test ELISA permet de détecter nombre de ces maladies, en particulier l'infection inapparente à M. paratuberculosis. La lutte contre ces maladies caprines, qui ont des répercussions sur la production de viande, l'amélioration des laboratoires, de même que l'augmentation du nombre d'employés formés et la production d'anti-sérums ou antigènes diagnostiques sont des mesures essentielles à prendre.*

Resumen: *Hay una variedad de enfermedades infecciosas que conducen al aborto y las pérdidas embrionarias en las cabras. Entre estas infecciones se encuentran las causadas por la Brucella melitensis, la Chlamydia, la Leptospira, y la Mycoplasma. Las pérdidas neonatales como resultado de la*

Escherichia coli, la fiebre aftosa y la infección causada por la coccidia, se consideran como infecciones significativas y su nivel de incidencia se estima que sea de un 20 a un 30%. Enfermedades insidiosas tales como la *Mycobacterium paratuberculosis* y los parásitos internos y externos ejercen influencia sobre el crecimiento, debilitando y atrofiando al animal. Organos como el hígado, los pulmones, el corazón y el cerebro se rechazan con frecuencia y se descomponen debido a la invasión y migración de parásitos que han tenido lugar en las cabras afectadas. Las enfermedades transmisibles tales como la tuberculosis, brucelosis, clamidiosis, e hidatidosis, cisticercosis y la taeniasis afectan negativamente la producción de carne, así como los virus lentos como el Visna/Maedi y el Jaagsiekete. Estas enfermedades se pueden controlar. La realización de pruebas regulares para detectar la presencia de brucelosis y la enfermedad de Johne y la eliminación de los animales infectados ayudarán a reducir la frecuencia de enfermedades. Además del control clínico sobre el *E. coli* y la coccidiosis, es de suma importancia mantener una higiene apropiada en las cabrerizas y asegurarse de que los animales reciban una alimentación rica en colostrum. Determinar la existencia de lombrices y usar los medicamentos adecuados en los rebaños de cabras infectadas es la manera más simple de controlar las infecciones parasitarias. Una prueba ELISA sobre el terreno se puede introducir para detectar exitosamente muchas enfermedades particularmente la infección subclínica de *M. paratuberculosis*. Es esencial combatir las enfermedades que afectan la producción de carne en las cabras, mejorar las instalaciones de laboratorio, la disponibilidad del personal entrenado y aumentar la frecuencia del diagnóstico antisera/antígeno.

The goat meat industry in India is mostly managed by the illiterate and poor. Farmers do not know enough about goat husbandry, particularly goat diseases. The occurrence of various infectious diseases in goats has been reported in different age groups (Singh et al. 1974, 1975; Jain 1977; Kulshrestha et al. 1978; Krishna and Rajya 1985; Singh, Singh et al. 1987; Vihan et al. 1987; Vihan and Singh 1988). Disease factors play a vital role in the retardation of body growth (Singh, Vihan et al. 1987; Vihan et al. 1987; Vihan and Singh 1988). The diseases of zoonotic importance are tuberculosis, *Brucella melitensis*, chlamydiosis, coenuriasis, etc. (Pathak 1968; Paliwal et al. 1971; Rao 1971; Charan et al. 1973; Jain et al. 1975). These diseases render the goat meat unsuitable for human consumption.

Abortions and embryonic losses

There are many disease factors that are responsible for causing abortions and embryonic losses in goats. *Chlamydia*, *Leptospira*, *Mycoplasma*, and *B. melitensis* are the main factors responsible for abortion in late pregnancy (Table 1). Pathak (1968) and Kulshrestha et al. (1978) reported 1–1.6% in losses as a result of *B. melitensis*. A high incidence of *Chlamydia* infection (20–30%) associated with abortion has been reported in goats (Krishna and Rajya 1985). *Mycoplasma* (*M. agalactiae*, *M. oculi*, *M. arginini*, serogroup 11) has been associated with inflammatory conditions of female genital tract and abortion in goats (Dhanda et al. 1959; Pathak and Singh 1984; Singh et al. 1975; Tiwana et al. 1984). The prognosis of *B. melitensis* infection is poor: elimination is the only solution. Antibiotics can be used in the preliminary stages of *Chlamydia* and *Mycoplasma* infection in goats.

Neonatal kid mortality

Stillbirths and neonatal mortality present problems to goat meat production, particularly under intensive management conditions. Neonatal losses can be separated into four groups: stillbirths as a result of *Chlamydia* infection, young mortality as a result of *Escherichia coli* infection (colisepticemia, colitoxemia, colibacillosis), foot-and-mouth disease, and coccidial infections (Shrama and Dutt

Table 1. Causes of abortion and embryonic loss in Indian goats.

Disease	Cause	Incidence of infection (%)	Pregnancy loss (%)	Source
Early embryonic loss	-	-	23-29	Achuthankutty and Raja (1971)
Late abortion	<i>B. melitensis</i>	2.15	1-1.6	Pathak (1968), Kulshresta et al. (1978)
	<i>Chlamydia</i>	20-30	7.9	Jain (1977), Krishna and Rajya (1985)
	<i>Mycoplasma</i>	17-18.1	-	Singh (1973), Tiwana et al. (1984), Singh et al. (1974, 1975)
	<i>Leptospira</i>	-	-	Pathnak and Singh (1984), Upadhye et al. (1980)
Stillbirth	<i>Chlamydia</i>	-	3-8.25	Jain (1977), Krishna and Rajya (1985)

Table 2. Neonatal mortality (%) as a result of various diseases.

Disease	Incidence (%)	Mortality (%)	Source
Colibacillosis + colisepticemia	39.3-60.0	5.4-19.0	Vihan et al. (1986), Vihan et al. (1987), Vihan and Singh (1988)
Chlamydia	-	62.8	Krishna and Rajya (1985)
Coccidiosis	12.0-32.3	5.1-12.3	Vihan et al. (1987)
Foot-and-mouth disease	-	3-16	McVicar and Suttmoller (1972), Singh, Vihan et al. (1987)

1968; Bhatia and Pande 1969). The incidence of *E. coli* infection in kids up to 30 days old was 39.3%; mortality, 5.4-19.0% (Vihan et al. 1988). The mortality in the preweaning stage varied from 8 to 72% (Table 2) (Bhat 1988).

Neonatal mortality can be prevented by improving the level of nutrition in advanced stages of pregnancy, ensuring hygienic conditions in the kidding sheds, providing proper bedding, and ensuring early feeding of colostrum. The monoclonal antibodies derived from the caprine species are desirable for therapeutic purposes for intestinal infections, particularly in the treatment of neonatal kid diarrhoea caused by *E. coli*.

Chronic diseases in adult goats

Gastrointestinal infections (coccidiosis, *Mycobacterium paratuberculosis* and internal gastrointestinal parasites (haemonchosis, tapeworm, and immature amphistomiasis) are common in goats maintained in confinement and when assembled from a wide variety of sources. These diseases of the digestive tract influence growth, weaning and stunting the animal (Mukherjee 1963; Shastri and

Ahluwalia 1972; Singh, Vihan et al. 1986, 1987). The internal and external parasites generally render the infected goats weak and anemic because of their constant feeding on host tissues. The absorption of essential nutrients is greatly interfered with, causing malnutrition. The determination of worm load and the use of suitable drugs in an infected goat flock is the simplest way to control parasitic infestations (Table 3). The prognosis of chronic infections like *M. paratuberculosis* is poor and elimination is the only solution. The extent of the loss in meat production because of these diseases is not known.

Slow-growing viruses

Slow-growing viruses like Visna/Maedi and Jaagsiekete occur in Indian goats, causing death and damaging the respiratory system. The viral disease of the lentivirus group is caprine viral arthritis encephalitis syndrome (CAE). This disease has been reported in a few Asian countries (Singh 1988), particularly Thailand. The prognosis of this disease is bad.

Contamination of goat meat

Valuable organs like the liver, lungs, heart, and brain are frequently damaged because of the invasion and migration of parasites. Fascioliasis in goats is an important disease that reduces the value and extent of meat production in goats (Arora and Iyer 1966; Gill et al. 1983). Other parasites include hydatid cysts and coenuriasis, which directly damage the meat and indirectly affect goat production. The prognosis of fascioliasis is good if effective drugs are given at the right time. The prognoses of both hydatidosis and coenuriasis are bad; slaughter is the only answer. Improved serodiagnostic tests are needed for detection of hydatidosis in goats.

Zoonotic disease factors

The evidence of zoonotic diseases occurring in goats is fairly common in India (Pathak 1968; Rao 1971; Charan et al. 1973; Jain 1977). These diseases can infect man and include tuberculosis, brucellosis, chlamydiosis, hydatidosis, and cysticercosis/taeniasis; all adversely affect meat production. To improve the quality of meat, proper carcass inspection in the slaughterhouses is necessary. Because of the frequency of these diseases in goats, it is recommended that legislation on meat-inspection measures be strengthened.

Problems and constraints to preventive health

Several new vaccines and other preventive measures have recently become available. The implementation of new preventative measures in a country like India requires an infrastructure of facilities at the village level. There is a paucity of trained labour in India and most of the problems of goat farmers remain unidentified and unsolved. This is partly due to an overemphasis on the health of cattle and inadequate exposure to goat diseases.

Table 3. Preventive measures for parasitic infestation.

Disease	Causative agent	Drug and dosage	Remarks
Fascioliasis	<i>Fasciola gigantica</i> <i>Fasciola hepatica</i> <i>Dicrocoelium dendriticum</i>	Zanil, 1 mL/3 kg BW Trodex, single dose injection, 1 mL/40 lb BW Hexchlorophane, 15 mg/kg, BW in alcoholic solution	100% effective 90-100% effective Effective and non- toxic
Immature amphistomiasis	<i>Paramphistomum cervi</i> <i>Cotylophoron cotylophorum</i>	Neguvon, 50-70 mg/kg BW Hexachlorethane, 1 mg/2 kg BW	94% effective 50% effective
Nematodiasis	<i>Haemonchus contortus</i> , <i>Ostertagia</i> spp. <i>Trichostrongylus colubriformis</i> , <i>Cooperia</i> spp. <i>Strongyloides</i> , <i>Bunostomum</i> , <i>Trichocephalum</i>	Nilverm, 15 mg/kg BW Thiabendazole, 50 mg/kg BW Fenbendazole, 50 mg/kg BW	Safe and effective 90-95% effective, 2 or 3 times/ year
Monieziosis	<i>Moniezia expansa</i> , <i>Moniezia benedeni</i> <i>Avitellina</i> spp., <i>Stilesia</i> spp.	Yomesan, 75 mg/kg BW Lead arsinatate, 0.5-1 g in gelatin capsule	
Mange	<i>Sarcoptes scabiei</i> , <i>Psoroptes</i> spp.	0.4% dipping with Cythion or Melathion	2 or 3 times/year

^aBW, body weight; 1 lb = 0.454 kg.

Diagnostic facilities and immunobiologicals

Disease prevention and efficient health control require adequate laboratory facilities and diagnostic antisera and antigens. There is also a need to develop an early diagnostic test to detect subclinical cases of *M. paratuberculosis* in goats. Disease-monitoring and surveillance systems have not been developed in most Asian countries.

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