Meat from small ruminants and public health in the Caribbean

S. Vokaty (1) & J.G.R. Torres (2)

(1) Inter-American Institute for Cooperation on Agriculture, P.O. Box 705C, Bridgetown, Barbados
(2) Pan American Foot-and-Mouth Disease Center, Ceixa Postal 589, CEP 20001-970, Rio de Janeiro RJ, Brazil

Summary
Small ruminants are very important livestock species in the English-speaking Caribbean. Total populations for the Caribbean region are approximately 677,000 goats and 281,000 sheep. Although the primary purpose of sheep and goats is meat production for local consumption, the animals are also a source of emergency income. Production systems are generally characterised as small-scale and low-input, and few breeding or productivity records are kept. Although intra-regional trade does occur between Caribbean countries, there is insufficient production for extra-regional trade. The Caribbean countries collectively have a very favourable animal health situation, which is maintained by strict import restrictions on livestock. Zoonotic diseases are relatively rare, with the exception of leptospirosis. The most important public health risk relates to the slaughter of small ruminants in small, unregulated butcheries which do not have acceptable standards of hygiene. In addition, meat is often transported or sold under unhygienic conditions. Recommendations are made for the reduction of these risks.

Keywords

Introduction
For the purposes of this paper, the Caribbean region is defined as the Greater and Lesser Antilles islands in the Caribbean Sea, and the mainland countries of Guyana and Belize. Although the languages spoken on this group of islands include French, Dutch and Spanish, this paper discusses only the English-speaking territories which collectively form the Caribbean Community common market (CARICOM). The only mainland (non-island) countries included in CARICOM are Guyana, located on the north coast of South America, and Belize, located in Central America. All CARICOM countries are sovereign and independent, with the exception of Montserrat, which is governed by the United Kingdom. A map of the Caribbean region is given in Figure 1.

These countries have a total human population of 5.8 million and a small ruminant population of approximately 958,000 head, comprising 677,000 goats and 281,000 sheep. The human and small ruminant populations of the CARICOM countries under discussion are given in Table I.

Small ruminants are very important livestock species in the Caribbean, not only for domestic meat production, but also as a source of emergency income. In Barbados, goats are reared primarily for milk production.

Most sheep and goat owners in the Caribbean are characterised as small-scale, low-input producers. Many owners are landless or own very small areas of land. Low levels of technology are utilised, with little financial investment in animal nutrition and care.

Most small ruminants are cross-bred. In Barbados, however, a specific genetic line of sheep known as the Barbados Blackbelly has been developed (Figure 2). The British Virgin Islands and Bahamas have also developed indigenous breeds of sheep, known as the Virgin Island White and Bahamas breeds, respectively. Due to tropical weather conditions, most sheep are haired rather than woolly. Few producers keep breeding or productivity records, with the exception of government breeding and research farms. Inbreeding is relatively common on small farms.
Meat production

The Caribbean region is a net importer of meat, mostly beef and poultry, as local production is insufficient to meet demand, particularly that created by the tourist industry. Small ruminant meat is mostly consumed by the local population, and, to a lesser degree, by foreigners tasting local and ethnic cuisine. Most Caribbean nationals prefer goat meat to mutton, if the price is competitive and supply is adequate.

As approximately 75% of small ruminants in the Caribbean are slaughtered in unofficial butcheries rather than government abattoirs, no accurate data on meat production can be provided. Total production for the Caribbean region in 1995 was estimated as 1,704,000 kg of goat meat and 803,000 kg of mutton and lamb (6). This figure was calculated by adding the number of slaughtered goats and sheep for each country and multiplying the sum by the mean number of kg per animal slaughtered, using the 1995 Production Yearbook of the Food and Agriculture Organisation (FAO) as a source. Such calculations must be interpreted with caution, however, as the FAO also estimates number of slaughtered animals per annum.

Animal trade

Trade in live animals occurs between the Leeward Islands, due to the close proximity of this group. There is no legal importation of live animals from the continent of South America (Guyana, Surinam, etc.) to the Caribbean islands, due to the threat of foot and mouth disease in particular, which exists in Brazil, Colombia and Venezuela. The exportation of small ruminants is minor, and mostly involves the export of Barbados Blackbelly breeding stock from Barbados to other tropical countries. There is insufficient domestic production of small ruminant meat to cater for local demand, therefore exportation of meat is insignificant.
Animal health status

The Caribbean countries as a group have a very favourable animal health situation, with the absence of most Office International des Epizooties 'List A' diseases (Table II). This situation has been maintained and safeguarded by strict import regulations, which permit the importation of animals only from countries with a similar or better health status.

In most Caribbean countries, the governmental Veterinary Services maintain responsibility for all animal health surveillance and disease control programmes. The exception is Jamaica, where the Veterinary Services were privatised in 1992; the Government maintains responsibility for regulatory medicine, quarantine and the importation and exportation of animals and animal products only.

Laboratory facilities

In general, governmental veterinary diagnostic laboratory facilities have been adversely affected by Structural Adjustment Programmes. Veterinary diagnostic laboratory services continue, albeit with limited capabilities, in Barbados, Belize, Grenada, Jamaica, St Lucia, and Trinidad and Tobago.

To address this deficiency, a proposal has been made to form a network of veterinary diagnostic laboratories, so that countries in the Caribbean region may utilise laboratory resources available in the French Antilles, Cuba, the Dominican Republic and other countries in the region.

Additional laboratory facilities are necessary to analyse meat for chemical and antibiotic residues. Such facilities currently exist only in Barbados and Jamaica. There is little information on the level of antibiotic, anthelmintic and acaricide residues in meat in the Caribbean. However, as most farmers practise low-input farming, these levels are unlikely to be significant.

Public health situation

Few zoonotic diseases exist in the Caribbean, therefore the public health risks associated with the consumption of livestock products are minimal. Foot and mouth disease, scrapie and brucellosis are notably absent (7). The exception for brucellosis is Trinidad and Tobago, which reports occasional serological evidence, without clinical signs, of *Brucella melitensis* in sheep.

The most frequent zoonotic disease of public health importance is leptospirosis, which is identified in all countries (4). A study by Everard et al. found that 42.4% of all sheep and goats from Antigua, Dominica, Grenada, St Kitts, St Lucia, Trinidad and Tobago, Guyana and Surinam gave serologically positive results to microscopic agglutination tests at a titre of ≥ 1:100 (5). Animal rabies is found sporadically in Grenada, where the reservoir is the mongoose (*Herpestes auropunctatus*), and in Guyana, Surinam, and Trinidad, where the reservoir is the vampire bat (*Desmodus rotundus*). Bovine tuberculosis has a relatively high prevalence rate in Guyana, but is not reported in small ruminants.
Salmonellosis has been reported in animals, particularly poultry (1). There is little evidence that humans contract this disease from ingestion of small ruminant meat, particularly in the Caribbean. Research is necessary to identify the source of infection.

Zoonotic parasitic diseases are also infrequent. One study by Bundy et al. reported fascioliasis in a region of Jamaica, but no human cases have been reported in any Caribbean country (3). There are no reports of other zoonotic parasitic diseases of small ruminants (1).

In most English-speaking countries of the Caribbean, the Ministry of Health has jurisdiction over meat inspection, and inspections are conducted by Environmental Health Officers, rather than veterinarians.

**Table II**
Zoonotic disease status of small ruminants in English-speaking countries of the Caribbean in 1995

<table>
<thead>
<tr>
<th>Country</th>
<th>Anthrax</th>
<th>Rabies</th>
<th>Brucella sp.</th>
<th>Leptospirosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua and Barbuda</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bahamas</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Barbados</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Belize</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Dominica</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Grenada</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Guyana</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jamaica</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Montserrat</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>St Kitts and Nevis</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>Suspected</td>
</tr>
<tr>
<td></td>
<td>(sporadic in goats, horses and swine)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Lucia</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>St Vincent and the</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Not diagnosed</td>
</tr>
<tr>
<td>Grenadines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>-</td>
<td>+</td>
<td>(sporadic in cattle)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>(sheep and goats)</td>
<td></td>
<td>(sheep and goats)</td>
<td>No clinical disease</td>
</tr>
</tbody>
</table>

- absent  + present

(b) risks of contamination during the processing and preparation of meat or meat products

c) risks of chemical residues being present in meat or meat products

With regard to category a), there is little or no risk that the consumer would contract zoonotic diseases from small ruminant meat or milk.

With regard to category b), the risks associated with meat processing are determined by the type of processing plant. There are two types of meat processing facilities in the Caribbean: abattoirs and butcher shops. Abattoirs may be subdivided into two types: those with acceptable hygienic conditions and meat inspection, and those without hygienic standards and inspection controls. Sheep and goats are frequently slaughtered and butchered at butcher shops, for local consumption. These establishments usually do not provide acceptable levels of hygiene, and may facilitate contamination of meat with bacteria, viruses or fungi (8). Many butcher shops lack running water; when available, the potability of this water may be questionable.

With regard to category c), there is a very limited risk that meat from small ruminants may contain chemical residues. Due to inadequate land space, particularly in small islands, many sheep and goats graze by roadsides. This may cause animals to inhale lead-polluted air. Some animals are grazed on sugar cane or other agricultural fields after harvest, potentially exposing the animals to chemical pesticides.

**Risk analysis of meat consumption**

Taking into consideration the current information on the animal health situations and specific studies undertaken in various countries of the Caribbean, the risks associated with small ruminant meat and/or animal products can be divided into three categories:

a) risks of meat and meat products contaminated by diseases caused by biological agents, directly communicable from the animal carcass to the consumer

b) risks of contamination during the processing and preparation of meat or meat products

c) risks of chemical residues being present in meat or meat products

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Further research is necessary to determine if these contamination levels are actually significant.

**Other possible risks**

Other factors may contribute to the risks associated with consuming small ruminant meat.

The transportation method of meat from abattoir or butcher shop to retail sales outlets may contribute to public health risks. In many cases, the meat is transported in a car trunk or cart, without refrigeration or physical protection. This practice increases the risk of contamination with gasoline fumes, motor oil and street dust.

Fresh meat, poultry and fish are frequently sold in the Caribbean at open-air or covered markets, which often do not have refrigeration facilities. As the daytime ambient temperature is usually very high (30°C), and these premises attract many flies, the potential is high for bacterial contamination and multiplication in meat. Meat may also be contaminated by dust if openly displayed in such environments.

**Risk reduction methods**

A common practice is to overcook or pressure-cook meat in the Caribbean, thereby reducing the health risks. However, cross-contamination may occur during food preparation in the kitchen.

As zoonotic diseases are virtually absent in small ruminants in the Caribbean, the public health risks posed by the consumption of meat are those associated with slaughter hygiene and meat transportation. The following measures are recommended to reduce these risks:

i) The transportation of meat and/or products of animal origin should be prohibited in containers or vehicles which are not equipped for this purpose. This should also be regulated by the health authorities.

iii) Public education and information programmes should be implemented to encourage consumers to purchase only high-quality meat products.

**Conclusions**

Small ruminants in the Caribbean are primarily produced for local meat consumption. As these countries are virtually free of zoonotic diseases transmissible through meat, the public health risks associated with the consumption of sheep or goat meat are negligible. However, the risk of contracting disease from eating the meat depends upon the level of hygiene at slaughter, during transportation to markets and at the retail sales outlets. Further studies are necessary to determine the level of contamination of meat by lead, antibiotics and chemical pesticides. Livestock producers, Veterinary Services, national health authorities, meat processors and retailers should work together to improve the hygienic status of meat and meat products delivered to consumers.

**Acknowledgements**

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Viande de petits ruminants et santé publique dans la région des Caraïbes

S. Vokaty & J.G.R. Torres

Résumé
Les petits ruminants constituent le principal bétail des Antilles anglophones, de Guyane et de Belize. Le cheptel total de cette région s'élève approximativement à 677 000 caprins et 281 000 ovins. Ces animaux sont essentiellement destinés à la production de viande pour la consommation locale, mais ils représentent également une source de revenu complémentaire. Il s'agit, en général, de petits élevages à faibles intrants, qui ne tiennent aucun registre sur la reproduction ou la productivité. Les échanges commerciaux se limitent aux pays de la région, la production étant insuffisante pour l'exportation. Ces pays bénéficient, dans leur ensemble, d'une situation très favorable sur le plan de la santé animale, grâce à de sévères restrictions à l'importation d'animaux. Les zoonoses sont relativement rares, à l'exception de la leptospirose. Le risque le plus important pour la santé publique est lié à la pratique de l'abattage de petits ruminants dans des boucheries non contrôlées, de taille modeste, qui ne répondent pas à des normes d'hygiène acceptables. L'hygiène fait souvent défaut, également, lors du transport ou de la distribution au détail de la viande. Les auteurs font quelques recommandations en vue de la réduction de ces risques.

Mots-clés

Carne de pequeños rumiantes y salud pública en la región del Caribe

S. Vokaty & J.G.R. Torres

Resumen
Los pequeños rumiantes son especies de gran importancia ganadera en las Antillas de habla inglesa, así como en Guayana y Belice. La población total de cabras de esa región del Caribe asciende aproximadamente a 677.000 cabezas, y la de ovejas a 281.000. Aunque su función primordial radica en la producción de carne destinada al consumo local, esos animales pueden constituir también una fuente de ingresos en caso de necesidad. Los sistemas de producción suelen definirse como pequeñas granjas con escaso nivel de inversión. Son contados los registros de cría o de productividad. Existen intercambios entre los países de la región, pero la producción es insuficiente para abastecer un comercio extraregional. En términos generales, el Caribe goza de una excelente situación en materia de sanidad animal, que se mantiene gracias a estrictas restricciones a la importación de ganado. Con la excepción de la leptospirosis, las enfermedades zoonóticas son relativamente infrecuentes en la región. Los principales riesgos de salud pública derivan del sacrificio de pequeños rumiantes en mataderos pequeños y no regulados que, no cumplen normas mínimas de higiene. Por
añadidura, la carne se transporta y vende en condiciones a menudo poco higiénicas. Los autores formulan recomendaciones encaminadas a la reducción de estos riesgos.

Palabras clave

References


