Ciliates of the Rumen of Domestic Ruminants in Kashan

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Summary
Protozoa are known to make an appreciable contribution to rumania fiber digestion in many different geographical areas; however, little if any information is available on their occurrence in domestic ruminants. Rumen contents obtained from 195 domesticated animals slaughtered at Kashan were surveyed for ciliate protozoa. Five genera including ten species were identified. The average ciliate, *Isotricha*, *Entodinium*, *Dasytricha*, *Metadinum* and *Ophryoscolex*, density was $29\pm18.2\times10^4$ml.

Key words: ciliate protozoa, slaughterhouse, domestic ruminants, Iran

Introduction

Rumen protozoa, which can play an important role by contributing nutrients to the host animal (Imai *et al* 1978), also play a role in the digestion of carbohydrate and protein containing feedstuffs by secreting saccharolytic and proteolytic enzymes (Nagasawa 1992, Shinichi 1987, William 1979). Although some investigations have been conducted in various geographical areas on the ciliate population occurring in ruminants, our knowledge about the overall distribution of protozoa in different animal hosts in different countries is limited. To date, it has been reported that approximately 120 species belonging to the family *Entodiniidae* (Grain 1994) and 163 species of *Ophryoscolecidae* family inhabit in the rumens of animals in different countries (William & Coleman 1992). During the past several years, a number of new species have been added to this list (Gocmen 2001, Oktem 1997). However, no

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compilation has been published on the protozoa population occurring in Iranian domestic ruminants. The purpose of the present study was to determine the rumen ciliates in a larger number of ruminants at Kashan on Isfahan province.

M erials and Methods

' mples of rumen contents were obtained from 195 mature domestic ruminant ncluding 80 sheep, 78 goats and 37 cattle at the slaughterhouse in Kashan, between 2001-2002. The animals were allowed to graze on the plateaus all day. They were generally slaughtered between 04 and 08 h, and samples taken immediately. The rumen wall was cut with a knife and a sample of rumen contents was removed via a catheter. A well-mixed sample of the rumen contents was diluted with 18.5% formaldehyde (Dehority 1994) as soon as possible after the animal was killed and sent to parasitology laboratory (Kashan University of Medical Sciences) for examination. Portion of each sample was also immediately fixed and stained with methylgreen formalin saline solution (Ogimoto 1981) for total and differential counts. All cell measurements were made with a calibrated ocular micrometer. Classification and identification of species was based on previously published species description and taxonomic lists (Grain 1994, Gocmen 2001).

Results and Discussion

The ciliate concentration in rumen contents of 195 ruminants living in different areas of Kashan from 9 to 59.5×10^4 per mal (CV=34.5%) is shown in table 1. The ciliate concentration in rumen contents of ruminants in different countries is also noted. Only three ciliate families Isotrichidae, Entodiniidae and Ophryoscolecidae were identified (Table 2). The majority of ciliate present in all 195 animals was in the family Isotrichidae, which constituted from 62.16 to 94.63% frequency of occurrence of the total protozoa.

Table 1. *Total ciliate concentration and distribution of the total number of genera and species in rumen contents at various locations around the world*

Locality	No. of animal	Total ciliates Mean±SD	Rang $\times 10^4$/ml	Total of genera	Total of species	References
Iran (Kashan)	195	29±18.2	9-59.5	5	10	Present study
Japan	125	40.3±1.9	6.5-17.25	15	48	Ito *et al* (1994)
Kenya	13	15.1	6.3-39.8	13	51	Imai (1988)
Canada	11	6.9	2.5-12.6	12	28	Imai *et al* (1989)
Sir Lanka	20	2.9±4.9	0.08-31.6	16	53	Imai (1986)
Mexico	10	8.3	0.07-21.9	13	38	Imai *et al* (1978)
Thailand	8	7.1±2.8	0.6-31.6	17	56	Imai (1984)
Brazil	4	26±17.7	9-51.2	14	55	Dehority (1986)
Turkey	28	52.4±20.7	16-87.5	13	52	Gocmen (2000)

Table 2. *Frequency of occurrence of family distribution of ciliates in rumen contents of sheep, goats, and cattle from slaughterhouse of Kashan*

Ruminants Family (%)	Sheep (N=80)	Goats (N=78)	Cattle (N=37)
Isotrichidae	0-19.24	0-11.25	62.16-94.63
Ophryoscolecidae	0-31.63	0-21.25	8.1-48.6
Entodiniidae	37.2-68.75	21.2-51.8	32.4-67.56

Three species of *Isotrichidae* were present: *Isotricha prostoma*, *Isotricha intestinally*, and *Dasytricha ruminantium* (Table 3). Four species of *Entodinium* and three species of *Metadinum* and *Ophryoscolex* were identified. For all species, coefficient of different values ranged was between 0.05 and 0.62. The mean number (±SD) of ciliates in rumen contents from the 195 domestic ruminants examined was $29\pm18.2\times10^4$ per ml (CV=34.5%). The geometric mean is 32×10^4cells/ml values ranged from 9×10^4 to 59.5×10^4. When compared with ciliate surveys from ruminants in other countries (Ito 1990 and 1994, Imai 1984, 1986, 1988 and 1990). In this study ciliate concentrations were 42.3×10^4/ml for sheep, 48.6×10^4/ml for cattle and 30.2×10^4/ml for goats. The difference between the numbers of rumen ciliates from different areas may be related with the kind and type of nutrition and geographical location.

Table 3. *Percentage distribution and frequency of occurrence of rumen ciliate protozoa in rumen contents from domesticated ruminants*

Species	Sheep No. (%)	Goats No. (%)	Cattle No.(%)
Isotricha prostoma	65 (81.25)	62 (79.50)	35 (94.63)
I.intestinalis	44 (55)	31 (39.7)	27 (72.9)
Dasytricha ruminantium	39 (48.75)	43 (55.1)	23 (62.16)
Entodinium ovinum	28 (35)	23 (29.48)	12 (32.43)
E.minimum	48 (60)	48 (61.50)	25 (67.56)
E.bovis	28 (35)	37 (47.40)	19 (51.35)
E.bursa	24 (30)	29 (37.20)	17 (45.94)
Metadinium affine	36 (45)	27 (34.60)	18 (48.6)
M.medium	6 (7.50)	9 (11.50)	3 (8.10)
Ophyroscolex purkynjei	13 (16.25)	13 (16.60)	7 (18.90)

The three species of *Ophryoscolecidae* found in this study, *Metadinum affine*, *M.medium* and *Ophryoscolex purkynjei*, are fairly widespread in sheep around the world (Imai 1978, Gocmen 2000). Both of these species were reported to co-exit in quite high frequently (80%) in Turkish domesticated goats (Gocmen 2001). *Isotricha* was present in all the Kashan domestic ruminants studied, while it was less frequent in Japanese cattle (83.2%). Frequency of appearance of *Isotricha*, *Entodinium*, *Metadinium* and *Ophryoscolex* was also higher in cattle domesticated ruminants, i.e. 94.63% vs. 62.16%; 67.56% vs. 32.4%; 48.6% vs. 8.1% and 18.9% respectively. Based on the observation of ciliate protozoa in rumen contents from 195 domestic ruminants in Kashan more investigation is recommended for their kinds, nutrition, epidemiology and taxonomic classification.

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