

Seasonal Changes of cecal microflora in Svalbard reindeers

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http://www.unis.no/60_NEWS/6030_Archive_2007/n_19_09_07_phd_veiberg/reindeer_Slide32_525pix.jpg

In this essay I am going to write about the seasonal changes in the cecal microflora of the high-arctic svalbard reindeer (*rangifer tarandus platyrhynchus*). How the microflora changes after different foods, since the svalbard reindeers have really different nourishment after seasons, and the percent of different bacteria either increase or decrease. I will also mention importance to prevent starvation.

The Svalbard reindeers have to have an impressive digestive system to be able to digest the different food they eat during different seasons. In the wintertime the food is highly fibrous and has poor-quality, but in the summertime they have to make a maximum use of the summer forage rich in seed heads, which contain high amount of starch and protein. Researches have shown that the highly specialized ruminant microflora is particularly effective in fiber digestion and nitrogen metabolism, the flow rate from the rumen is high, containing plant tissues which are not digested in the rumen.

A research was done to provide information on the potential contribution of the cecum to plant digestion. A dominant culturable cecal bacteria was characterized in a small group of these animals. One part of the research was done in winter time and another in summer time.

Culturable cecal bacteria of Svalbard reindeer

Bacteria	September	April	April as a % of September
<i>Butyrivibrio fibrisolvens</i>	20,7±3,1(23)	2,8±1,3(18)	14
<i>Selenomonas ruminantium</i>	8,9±1,8(10)	1,2±1,7(8)	14
<i>Succinivibrio dextrinosolvens</i>	1,8±1,3(2)		
<i>Lachnospira multiparus</i>	0,7±0,7(1)		
<i>Lactobacillus sp.</i>	0,7±0,7(1)	1,0±0,7(7)	143
<i>Megasphaera elsdenii</i>	1,8±1,3(2)	0,4±0,7(3)	22
<i>Bacteroides ruminicola</i>	8,9±2,3(10)	4,0±1,8(26)	45
<i>Bacteroides amylophilus</i>	6,0±1,3(7)	0,8±0,3(5)	13
<i>Ruminococcus albus</i>	2,9±1,5(3)	0,8±0,3(5)	28
<i>Ruminococcus bromii</i>	2,9(3)	0,2±0,3(1)	7
<i>Streptococcus bovis</i>	14,8±0,9(17)	0,8±0,8(5)	5
<i>Streptococcus faecium</i>	4,5±1,5(5)	1,0±0,6(7)	22
<i>Streptococcus faecalis</i>	8,9±7,5(10)	1,0±0,7(7)	11
Others	6,0±1,5(7)	1,2±1,6(8)	20

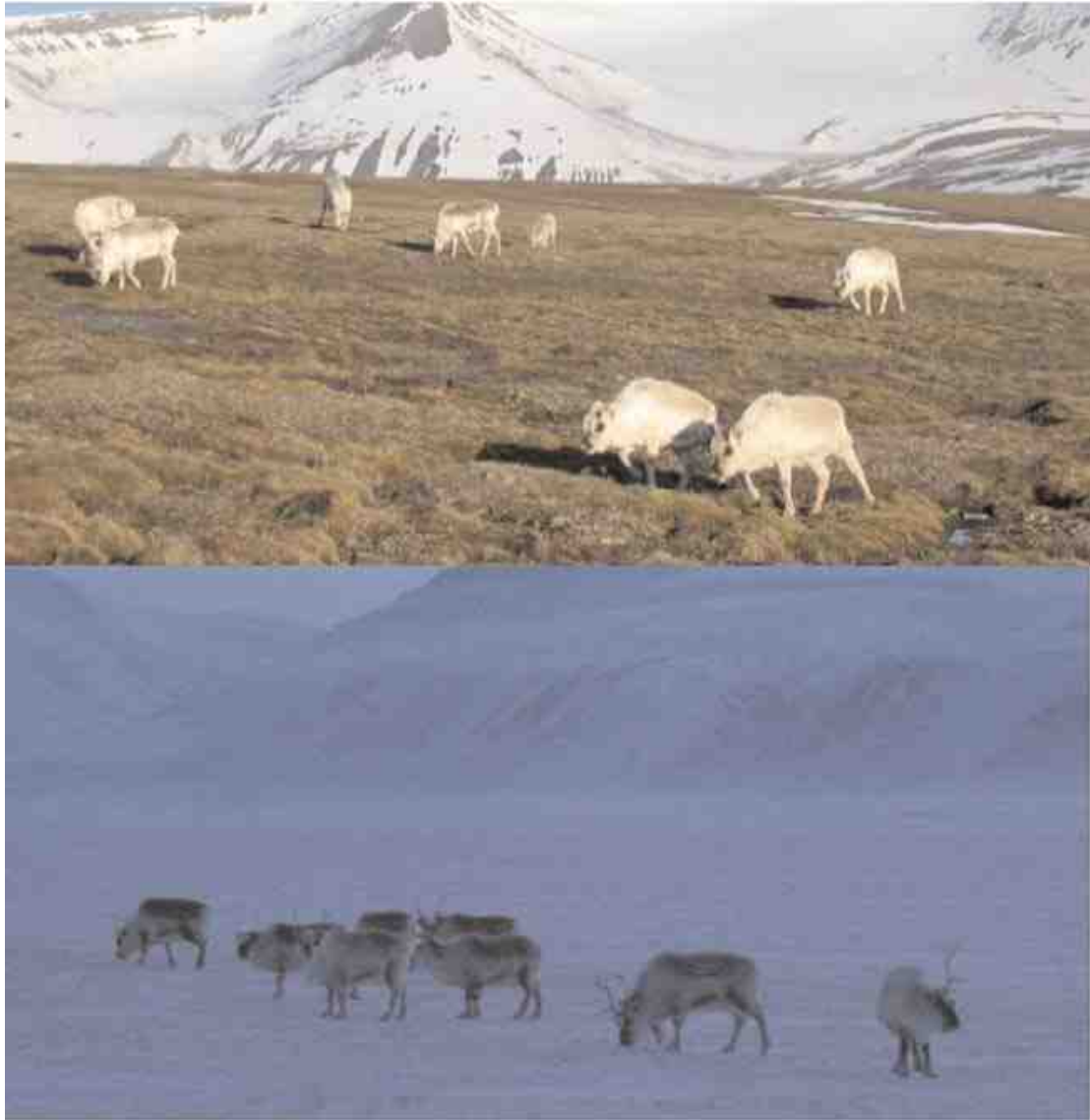
Species composition and population densities in absolute numbers and percentage of total in

September (high-arctic summer) and in April (high-active winter). Together with April population densities expressed as percentages of September values.

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The summary from this table is that during the summer the total cultured viable population density was $2,09 \pm 1,26$ cells ml⁻¹ and $0,36 \pm 0,29 * 10^{10}$ cells ml⁻¹. And from this is possible to find out the utilization of different foods. Starch utilization was 68% during the summer and decreased to 63% during winter, fiber digestion was 31% and then 74%, cellulolysis 15% and then 35%, xylanolysis 30% and then 58 %, proteolysis 51% and then 28%, ureolysis 40% and then 54% and lactate utilization 13% and then 4%.

Ammonia production is necessary in the rumen to optimize the use of dietary carbohydrates by optimizing bacterial growth. Many bacteria use ammonia as a nitrogen source and during starvation the ammonia, which is hydrolyzed from urea will enter the rumen with the saliva and therefore would satisfy the nitrogen requirements for the animal. Fat is also an important part of the Svalbard reindeer's life; it is one of the main parts that make them capable of surviving the winter. In this research it was calculated that 10-30% of daily energy during wintertime could be covered by mobilization of fat. The animals built the fat up during the summer but undergo a considerable body weight reduction with loss of fat and lean tissue during wintertime because of the poor-quality nutrition.



Svalbard reindeer in polar light conditions. Midnight in late June (top) and midday in mid-February (bottom). Credit: © Nature

[http://www.livescience.com/php/multimedia/imagedisplay/img_display.php?pic=051221_reindeer_02.jpg&cap=Svalbard+reindeer+in+polar+light+conditions.+Midnight+in+late+June+\(top\)+and+midday+in+mid-February+\(bottom\).+Credit%3A+©+Nature](http://www.livescience.com/php/multimedia/imagedisplay/img_display.php?pic=051221_reindeer_02.jpg&cap=Svalbard+reindeer+in+polar+light+conditions.+Midnight+in+late+June+(top)+and+midday+in+mid-February+(bottom).+Credit%3A+©+Nature)

In the photo above there can be seen Svalbard reindeers in both summer and wintertime. Weather and food conditions are really different and also their coat and horns, since reindeers loose their horns every year.

Writing this essay gave me a good idea how the body can adapt to different situations. Here I am not only talking about the changing in the microflora but also the body conditions. How the animal builds up fat during the summertime to be able to survive the hard winters with poor-quality food and the changing in their coat, because the Svalbard reindeers are known to have a very dense coat especially during the winter.

References.

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