

## QUANTITY AND CHEMICAL COMPOSITION OF MANURE PRODUCED BY DEER

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The breeding process of the deer is always connected with its by-product- deer manure. During the winter period one part of the manure accumulates in the feeding places or sheds, but in summer it remains in pastures thus increasing the nutrients stocks for the formation of the grass mass.

Some of the deer parks are located in vulnerable zones of Bauska, Dobeles, Jelgava and Riga districts. According to requirements of EU Nitrate Directive (91/676/EEC) there is a set limit for livestock manure application to agricultural land. Therefore the number of animals and the agricultural land area used for manure application should be kept in balance. Livestock unit is used as an index to describe the number of animals and livestock density per unit of land area. In compliance with the regulations of Latvia the livestock unit is determined as the number of animals that produce an amount manure equivalent to 100 kg nitrogen (N) ex storage.

In order to specify livestock units per deer the quantity of manure produced by deer and content of nitrogen, phosphorus and potassium in manure of deer were ascertained.

Our investigation was done in four deer breeding farms (Table 1). During this investigation we stated the feed consumption and took samples of deer manure and feed. The chemical composition of manure and feed were analyzed at laboratories accredited according to the LVS EN ISO/IEC 17025 standard.

1. tabula Table1

Pētījumu vietas <i>Sites of investigations</i>	
Saimniecība Farm	Briežu skaits <i>Number of deer</i>
"Saulstari-1", Rīgas district	190
"Zemitani", Aizkraukles district	1356
"Staltbrieži", Cēsu district	52
"Mezsetas 97", Balvu district	253

Quantity of manure and N, P, K produced by deer were fixed using an approach recommended by the European Commission. Calculation was based on data of feed intake, feed chemical composition and digestibility, as well as on data of N, P, K removed by production and retention in body and losses of these nutrients.

According to the data obtained from the analysis of the deer faeces (Table 2, 3) one ton of natural-moist faeces contains at an average 7,9 kg nitrogen (N), 5,4 kg phosphorus (P<sub>2</sub>O<sub>5</sub>), 4,9 kg potassium (K<sub>2</sub>O), 4,8 kg calcium (Ca), 1,4 kg magnesium (Mg) and 221 kg organic matter. Comparatively great differences are stated in the faeces chemical composition of several farms, especially in spring period. In summer grazing period the phosphorus, calcium and magnesium level in the deer faeces is slightly higher, but potassium level lower than in spring period faeces (Table 2, 3, Picture1). It could be explained by different feed ration and feed chemical composition.

## 2. tabula Table 2

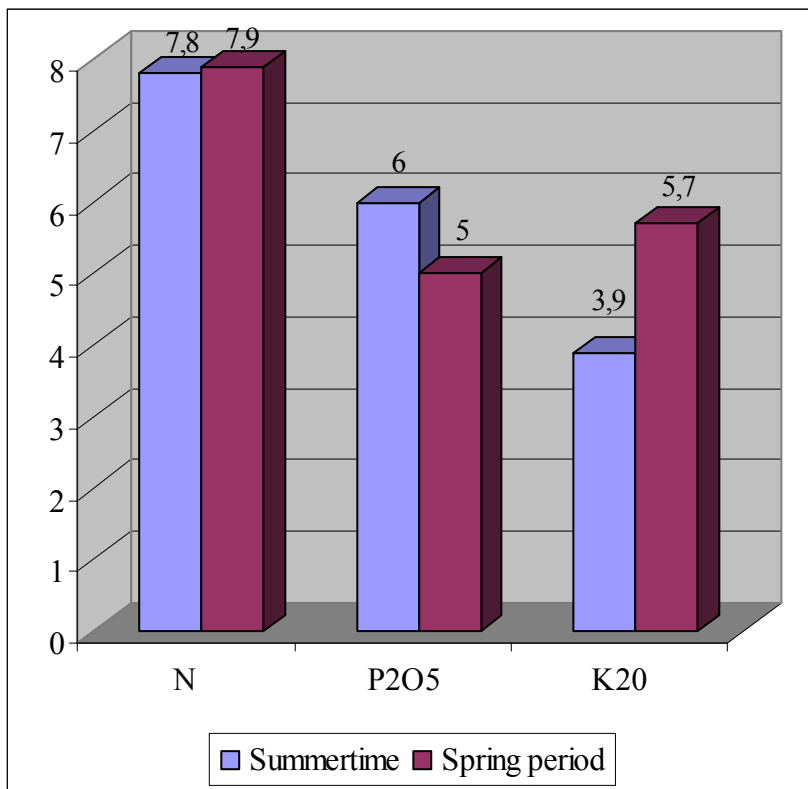
Briežu tvirto ekskrementu ķīmiskais sastāvs vasarā  
Chemical composition of faeces produced by deer in summertime

Rādītājs un mērvienība <i>Indices and measurement unit</i>	Average	Min	Max
Sausna <i>Dry matter</i> , %	24	22	25
pH- H <sub>2</sub> O	7,72	7,54	8,22
Saturs dabiski mitros svaigos tvirtos ekskrementos, kg/t <i>Content, kg per ton of natural -moist fresh faeces:</i>			
Kopējais slāpeklis <i>Total nitrogen (N)</i>	7,8	6,5	8,9
t.sk. amonija formā (NH <sub>4</sub> -N)	0,5	0,2	0,8
Fosfors <i>Phosphorus (P<sub>2</sub>O<sub>5</sub>)</i>	6	4,6	8,4
Kālijs <i>Potassium(K<sub>2</sub>O)</i>	3,9	2,3	4,8
Kalcijs <i>Calcium(Ca)</i>	5,8	4,6	7,2
Magnijs <i>Magnesium(Mg)</i>	1,6	1,4	1,9
Organiskā viela <i>Organic matter</i>	214	185	265

## 3. tabula Table 3

Briežu tvirto ekskrementu ķīmiskais sastāvs pavasara periodā  
Chemical composition of faeces produced by deer in spring period

Rādītājs un mērvienība <i>Indices and measurement unit</i>	Average	Min	Max
Sausna <i>Dry matter</i> , %	29	26	32
pH- H <sub>2</sub> O	7,9	6,93	8,91
Saturs dabiski mitros svaigos tvirtos ekskrementos, kg/t <i>Content, kg per ton of natural -moist fresh faeces:</i>			
Kopējais slāpeklis <i>Total nitrogen (N)</i>	7,9	5	9,8
t.sk. amonija formā (NH <sub>4</sub> -N)	0,6	0,3	0,9
Fosfors <i>Phosphorus (P<sub>2</sub>O<sub>5</sub>)</i>	5	2,7	7,3
Kālijs <i>Potassium(K<sub>2</sub>O)</i>	5,7	4,5	8
Kalcijs <i>Calcium(Ca)</i>	4	1,6	6
Magnijs <i>Magnesium(Mg)</i>	1,3	0,8	1,8
Organiskā viela <i>Organic matter</i>	227	205	253



1. attēls. Slāpekļa, fosfora un kālija saturs briežu mēslos dažādos periodos Picture1 Content of nitrogen, phosphorus and potassium in deer faeces in different periods

The data of analysis show only the chemical composition of faeces. In accordance with the scientific literature data faeces contain about 55% of nitrogen extracted by deer, 93% of phosphorus and 40% of potassium. The urine of the animals contains little phosphorus and comparatively much potassium. When keeping animals in farms urine sucks up in bedding material or flows to manure storages but in deer breeding farms the urine sucks up in pasture soil (Table 4).

4. tabula Table 4

**N, P, K izdalīšanās dzīvnieku urīnā un tvirtajos ekskrementos (%)**

**N, P, K excretion in urine and faeces of animals (%)**

(by Klepel R.)

	N	P	K
Urine	45	7	60
Faeces	55	93	40

The analysis of deer feed shows differences in nitrogen, phosphorus and potassium content in different farms. Especially it concerns potassium level in grass, hay, silage, grain and potatoes (Table 5).

5. tabula Table 5

Slāpekļa, fosfora un kālija saturs briežu barībā

Content of nitrogen, phosphorus and potassium in the deer feed

Barības veids Type of feed	Sausna Dry matter, %	Dabiski mitrā barībā <i>In natural-moist feed,%</i>					
		N		P <sub>2</sub> O <sub>5</sub>		K <sub>2</sub> O	
		Average	Min-max	Average	Min-max	Average	Min-max
Ganību zāle <i>Grass of pasture</i>	19	0,44	0,38-0,48	0,14	0,11-0,15	0,24	0,17-0,35
Siens <i>Hay</i>	86	1,15	1,03-1,28	0,28	0,25-0,32	1,29	0,98-1,62
Skābsiens <i>Haylage</i>	51	1,35		0,39		1,59	
Skābbarība <i>Silage</i>	27	0,45	0,44-0,46	0,2	0,18-0,23	0,38	0,18-0,59
Auzu graudi <i>Oatgrain</i>	86	1,64	1,47-1,81	0,54	0,48-0,60	0,54	0,42-0,67
Cukurbietes <i>Sugar-beets</i>	25	0,31	0,2-0,42	0,1	0,07-0,13	0,22	0,19-0,24
Kartupeļi <i>Potatoes</i>	19	0,32	0,28-0,36	0,08	0,10-0,05	0,29	0,16-0,42

6. tabula Table 6

Viena brieža gadā ražotais mēslu un N, P, K daudzums

Quantity of manure and N,P, K produced by one deer per year

Saimniecība <i>Farm</i>	Mēslu daudzums <i>Quantity of manure, t</i>	N, kg	P <sub>2</sub> O <sub>5</sub> , kg	K <sub>2</sub> O, kg
Mezsetas 97	2,5	24,8	7,2	13,2
Saulstari-1	2,3	23,6	6,6	20,4
Staltbrieži	2,5	26,9	6,2	19
<b>Vidēji Average</b>	<b>2,4</b>	<b>25,1</b>	<b>6,7</b>	<b>17,5</b>
Iespējamie zudumi <i>Possible losses</i>	0,6	11,3	0,6	1,8
<b>Vidēji, ņemot vērā zudumus Average, considering into account losses</b>	<b>1,8</b>	<b>13,8</b>	<b>6,1</b>	<b>15,7</b>

Following the European Commission recommendations in Latvia it is stated that at an average one deer per year produces 15.2 kg nitrogen, 7.1 kg phosphorus and 14.4 kg potassium (with the exception of losses).

According to the data obtained on quantity of nitrogen produced by deer, one deer corresponds to 0,15 Livestock Units (Livestock Units is determined as the number of animals that produce an amount of manure equivalent to 100 kg N ex storage).

Admissible density of deer in vulnerable zones of Latvia – 11 deer per ha .