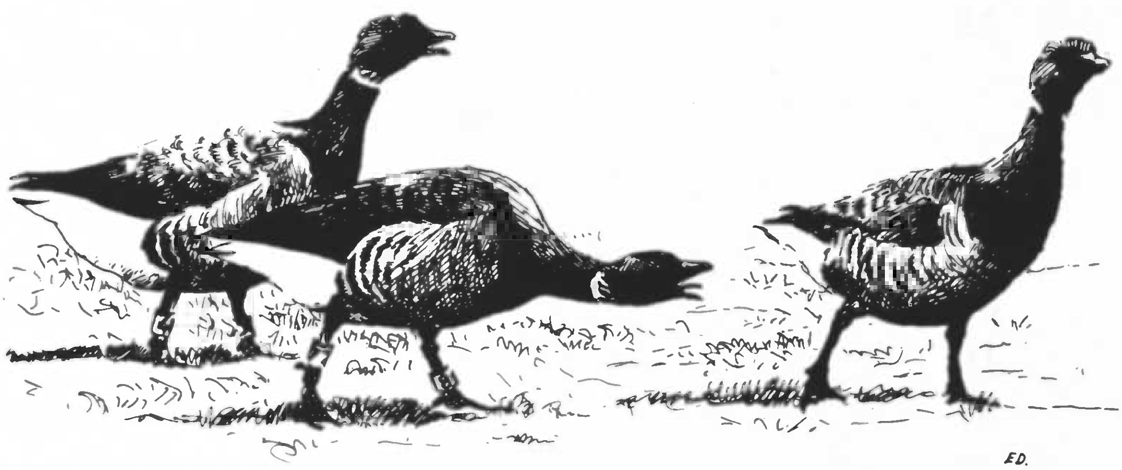
Variation in Intake Rate of Brent Geese, *Branta bernicla*, depending on plant biomass and quality of the vegetation.



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ABSTRACT

Food depletion is a common phenomena in nature, however it is hard to measure in the field. In the case of the foraging behaviour of a herbivore, a decrease of intake rate is due depletion. In this project, intake rate has been measured in relation with biomass and quality of the vegetation. Intake rate can be measured by offering turves to the Brent Geese, *Branta bernicla bernicla*, and by measuring the weight loss of the turf when the geese are feeding. Peck rate and bite size, components of the intake rate, have also been measured in order to determine which variable influences mainly the intake rate.

When depletion occurred, a decrease of the intake rate has been measured. A positive relation links the intake rate with the biomass. The intake rate is also dependent on the quality of the vegetation, in this study defined as fertilization of the turves. For a higher quality of the vegetation, the intake rate is higher.

CONTENTS

INTRODUCTION

Optimal foraging theory assumes that herbivores feed first in the patch with highest food density. Once the food density in that patch has been depleted and become less profitable, the herbivores should switch to the next highest density patch (Schneider 1984, Sutherland and Anderson, 1993).Depletion phenomena are hard to measure because food availability is not only food dependent. The food preference of the herbivore is also based on the vegetation type and quality. In fact, food preference is defined in relation with biomass, quality of the vegetation and intake rate. Estimates of forage intake can be useful to gain a better understanding of a population's habitat requirements (Hupp, White, Sedinger and Roberstson, 1996, Sutherland and Allport, 1994). The assumption tested during this investigation is that the intake rate has a positive relation with biomass and food quality (Porp and Loonen, 1986, Tolsma, 1998).

The main goal of the experiment is to measure intake rate and to relate it with biomass and quality of the vegetation. In order to measure intake rate, we offered turves of vegetation to the geese and we let them pecking an average of 50 pecks. The main measurements done were the intake, in gram, got from weighing the turf before and after the geese had fed on, the exact number of pecks done by each bird and the exact pecking time. These different measures permit to calculate the peck rate of each geese, the bite size and the intake rate. This investigation has been done in relation with field work done in Schiermonnikoog and the North Coast; the turves used came from these two areas. The herbivores used were Brent Geese, *Branta bernicla bernicla*, and the main vegetation presented was *Puccinellia maritima*. The *Puccinellia* is the principal food species in the diet of the geese. *Puccinellia* is common and abundant on the salt-marshes of north Holland. Moreover, *Puccinellia* has a high protein content. Nevertheless, the diet of the Brent Geese is also based on *Plantago maritima, Triglochin maritima* and *Festuca rubra*. Due to their restricted distribution in the field, *Plantago* and *Triglochin* represent a limited part of the geese diet. *Festuca rubra* is mainly used by the geese as a substitute for *Puccinellia* (Prop and Deerenberg, 1991).

The first aim of the experiment is to measure the intake rate and to correlate it with variation in biomass. The addressed problem was (1) in which way intake rate varies according to biomass, (2) which factors (peck rate or bite size) influence mainly the variations of the intake rate. We expected that intake rate increase with the available plant biomass (Trudell and White, 1981).

The second aim of the experiment is to investigate additional effects of the quality of the vegetation (fertilized and non fertilized vegetation). We will investigate how the fertilization can influence intake rate. Food quality and intake rate are interrelated so intake declines as food quality declines (Trudell and White, 1991).

The third goal is to determine if intake rate is mostly affected by biomass or by quality of the vegetation.

MATERIALS AND METHODS.

Geese.

The birds, used during the experiment, were two Brent geese, *Branta bernicla bernicla* Brent Geese are an arctic species which used to spend the wintering time along the coast of Holland, Germany, England and France. In May, they migrate to Siberia for the breeding and moulting period.

For this experiment, a pair of geese have been chosen: the male was JA and the female JC. The couple has been kept in a small room from January to May. When this experiment started in April the couple was already used to live in this room and were not very afraid of humans.

The regular weighing permitted to check the health of the geese. In order to minimize the stress of the birds, they have been caught as less as possible. The weighing was effected by letting the geese go on the balance by their own. Day time was first from 8:00 to 19:00 and has been changed gradually to 9:00 to 24:00. The rhythm of the day has been switched in order to respect the natural change of the daylight which cause the need of moulting, breeding and migration.

The alimentation of the geese consisted of dry food and turves of grass; fresh water was brought every day. The cleaning of the room was done every morning.

Turf

The turves tested during this investigation came from the North Coast of Groningen and from Schiermonnikoog.

The experiment made on the salt-marsh of the North Coast of Groningen, by Monique Timmner, presented two blocks of six plots each. In each plot, on site was fertilized and the other exclosed from grazing in order to observe the food preference of the geese. Four geese were feeding for 24 hours on each plot and depleted the vegetation. During this experiment, for each plot two turves of each site for different time were tested; in total 131 turves have been tested.

The investigation made in Schiermonnikoog, by Daan Bos, presented four trays. In each tray there were four plots spread in the field. Each plot got a different treatment: the black one was grazed and not fertilized, the green one was ungrazed and fertilized, the red one was ungrazed and not fertilized and the yellow one was grazed and fertilized. In the field, the different plots were opened for wild geese and the behaviour (residence time, peck rate, step rate, fights) was recorded. In the laboratory, two turves of each plots of each tray have been tested for intake rate; so in total 32 turves have been tested.

The size of the turves was standard, 301 cm^2. After their cutting, the turves were tested as soon as possible but in order to keep the vegetation in its initial form the turves were kept in a cold room, at 4°C.

Set up of the intake experiment.

The aim of this investigation was to measure the weight loss of by the turf during the feeding of the geese.

Before offering the turf to the geese the evaporation was measured during five or six minutes by weighing the turf twice. The time was also noticed in order to calculate the time spent between the end of the evaporation measurement and the end of the feeding trial.

After the evaporation measurement, the turf was offered to the geese. During the feeding time the geese were filmed with a video camera. After 50-60 pecks done by one or both of the geese, the feeding was stopped. The use of a constant and low number of pecks permits to assume that depletion can not occur. At the end of foraging, the turf and the spilled biomass were collected and weighed, the time was also noticed. In order to keep the same feeding motivation of the geese, the interval time between two foraging period was an average of twenty minutes.

After foraging, all green plants were clipped. The different vegetation type were separated between the main species, mostly *Puccinellia maritima*, the other minority species, mostly *Salicornia* and *Sueda maritima* and dead material. These different kinds of vegetation were washed separately and put in the oven during 48 hours or more at 70 degree Celsius. The weighing of the vegetation was done at the end of the drying. The weighing permitted to calculate the biomass available per square meter.

Analyzing the tape

For each bird and each turf, the following measurements were done:
-Feeding or foraging time: time spent between the first and the last peck.
-Pecking time: time during which the geese were only pecking.
-Processing Time: time during which the geese were only processing the grass.
-Number of head up: number of time when the geese raised their head up, this measurement gave some information about the feeding behaviour and the foraging motivation.
-Number of fights: estimation of the interaction between the geese.
-Number of pecks done.

Sum up of the data:

The data were organized as follows :
- Number of the turf, its origin and plot.
- Intake in gram: the intake has been calculated by subtracting the amount of grass lost and the evaporation during the feeding time from he weight loss of the turf during the feeding. The evaporation during the feeding has been calculated with the evaporation measured before the feeding and the time spent between the beginning and the end of the feeding.
- Number of pecks of each bird
- Feeding time
- Pecking time
- Processing time
- Number of head up
- Peck rate, in peck per second, of each bird calculated by dividing the number of peck by the pecking time. The pecking time has been used in order to get more precise data.

- Bite size, in gram per peck, calculated by dividing the intake, in gram, by the total number of pecks done by the two geese.
- Intake rate, in gram per second, calculated by dividing the intake, in gram, by the pecking time of the two birds
- Biomass, in gram dry per squared meter, was calculated with the weight of the dry grass.

In order to analyze the peck rate in relation with the biomass, regression tests have been made.

For the calculation of the bite size and the intake rate, the total intake in gram, the number of pecks of the two birds and the pecking time of both of the birds have been used. To allow for potential differences in bite size and in intake rate the fraction of bites made by the male was included as potential variable in the model. The statistical test used was ANCOVA (procedure manova in spss) and the interaction between the plots, the biomass and the fraction of bites made by the male have been tested. Only significant interactions have been included in the final model.

For the turves coming from Schiermonnikoog, the mean, the standard error and the analysis of the variance have been calculated for the different treatments.

RESULTS

Relation with biomass

A relation between intake rate and biomass is expected, based on earlier results (Prop and Loonen 1986, Tolsma 1998, Trudell and White, 1981). In this section, we investigated this relation not only for the intake rate but also for the components determining intake rate (peck rate and bite size). These components are analyzed separately in relation with biomass. The results measured on turves from Schiermonnikoog and from the North Coast of Groningen are presented separately.

Schiermonnikoog

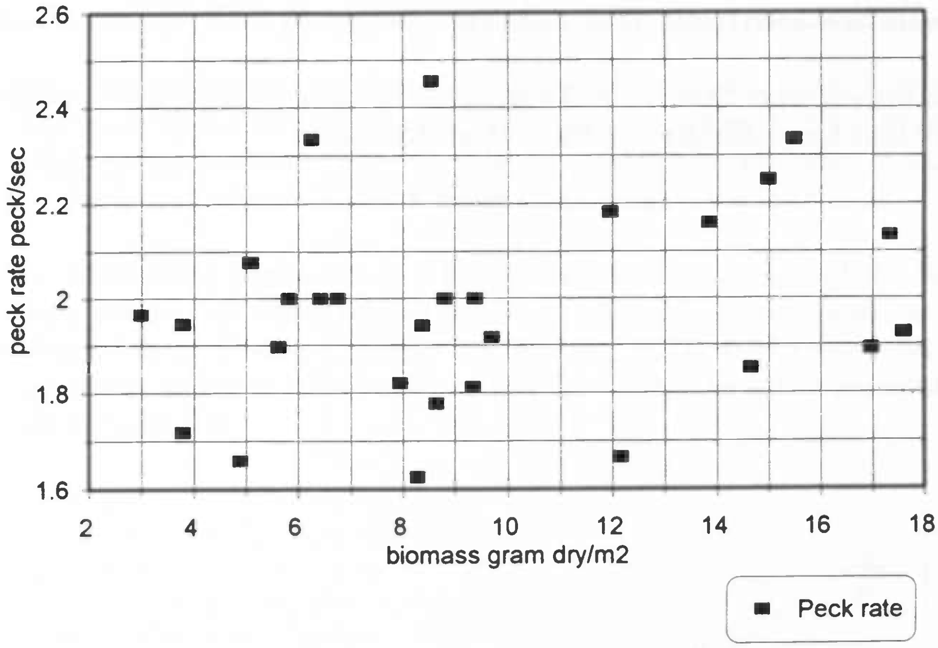

Figure 1: Peck rate of the female related to biomass.

No relation has been found between peck rate of the female and biomass

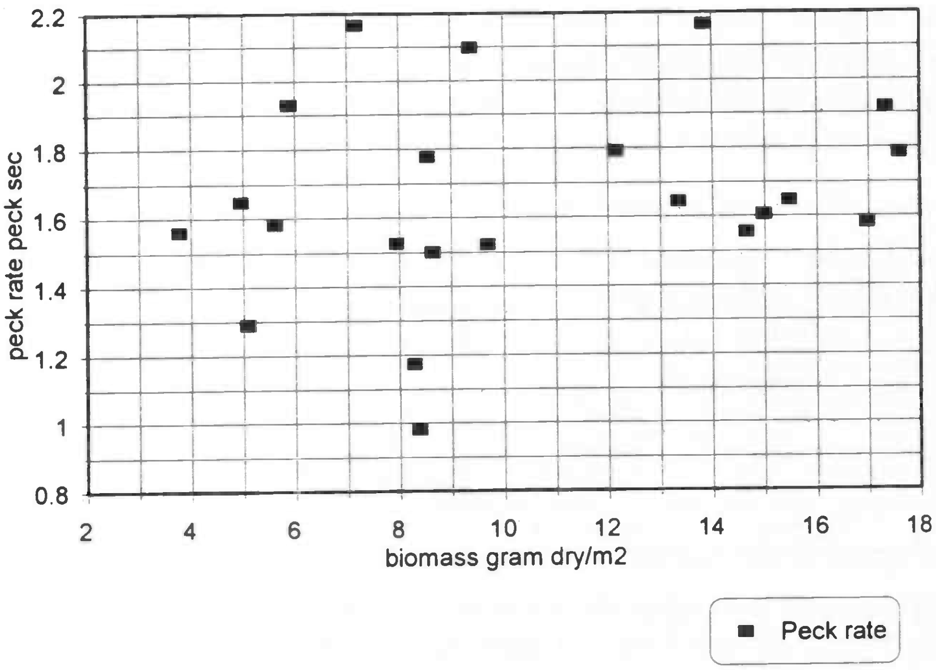

Figure 2 : Peck rate of the male related to biomass

No relation has been found between peck rate of the male and biomass

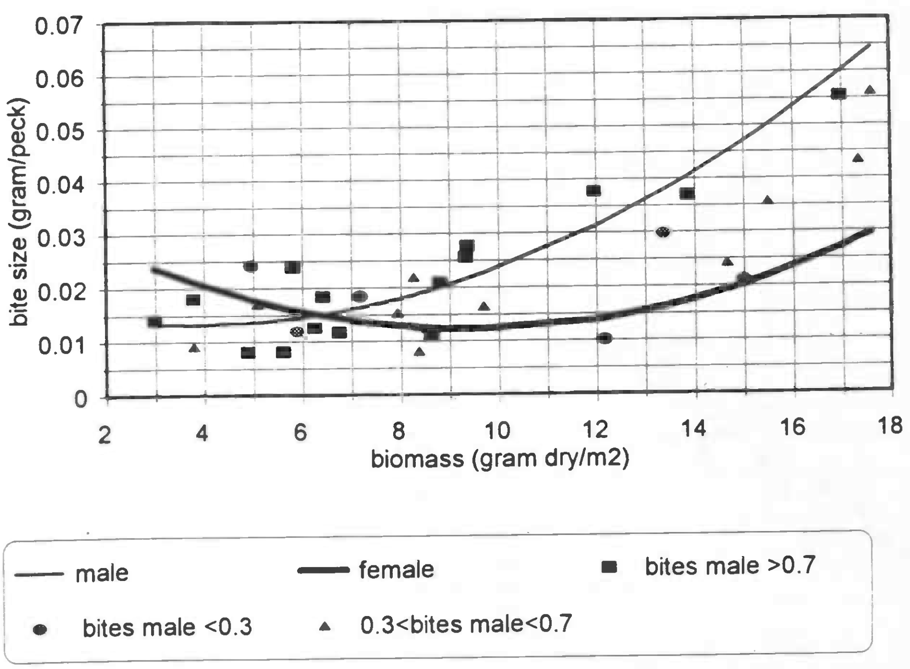

Figure 3: Bite size related to biomass, fraction of bite made by the male and interaction between those variables.

With the statistic test ANCOVA (procedure manova in spss), intake rate has been correlated with biomass, fraction of bite made by the male, interaction between these variables and square biomass. The table 2 gives the coefficients of the quadratic relation found.

Table 2 : Coefficients, F values, degrees of freedom and significance corresponding to the relation between intake rate and biomass (figure 4)

Variables	Coefficient	F	df	P
constant	0.222			
biomass	-0.0321	7.61	1,27	0.001
square biomass	0.00164	11.76	1,27	0.002
bite male	-0.127	4.45	1,27	0.044
Biomass*bite male	0.0219	10.44	1,27	0.003

The rectangular points represent the intake rate when the male is mostly eating (fraction of bites made by the male > 0.7) and the circle one represent the bite size when the female is mostly eating (fraction of bites made by the male < 0.3). The value of intake rate used has been calculated in relation with the measures done during the investigation.

We tested if the intake rate is a function of the peck rate or of the bite size. Earlier results demonstrated that intake rate of herbivores increases asymptotically as a function of bite size (Gross, Shipley, Hobbs, Spalinger and Wunder, 1993). In this study, we also found that intake rate is only varied in relation to bite size Bite size is an useful predictor of short term intake rate of herbivores.

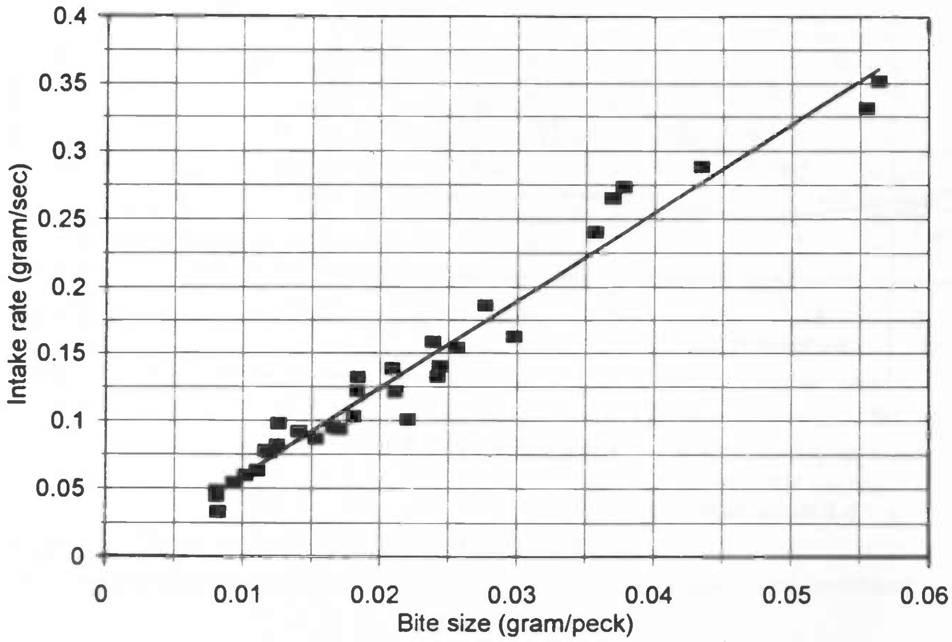

Figure 5 : Intake rate related to bite size.
A positive relation links intake rate to bite size. The equation found is $y = 6.51 x - 0.00604$ with $F(1,30)=856.17$, $p=0.000$ and $r^2=0.982$

With the statistic test ANCOVA (procedure manova in spss), bite size has been correlated with biomass, fraction of bites made by the male, interaction between these variables and the square biomass. The coefficients related to the quadratic relation found are given in the table 1.

Table 1 : Coefficients, F values, degrees of freedom and significance corresponding to the relation between bite size and biomass (figure 3)

Variables	Coefficient	F	df	P
constant	0.0366			
biomass	-0.00511	8.94	1,27	0.006
square biomass	0.000268	14.58	1,27	0.001
bite male	-0.0196	4.94	1,27	0.035
Biomass*bite male	0.00309	0.005	1,27	0.005

The rectangular points represents the bite size when the male is mostly eating (fraction of bites made by the male > 0.7) and the circle one represent the bite size when the female is mostly eating (fraction of bites made by the male < 0.3). The value of those bite size used has been calculated in relation with the measures done during the investigation.

For the figures 3 and 4, bite size and intake rate of the male has been calculated by the formula found and with the fraction of bites made by the male equal to one. Bite size and intake rate of the female has been calculated by the formula found and with the fraction of bites made by the male equal to zero.

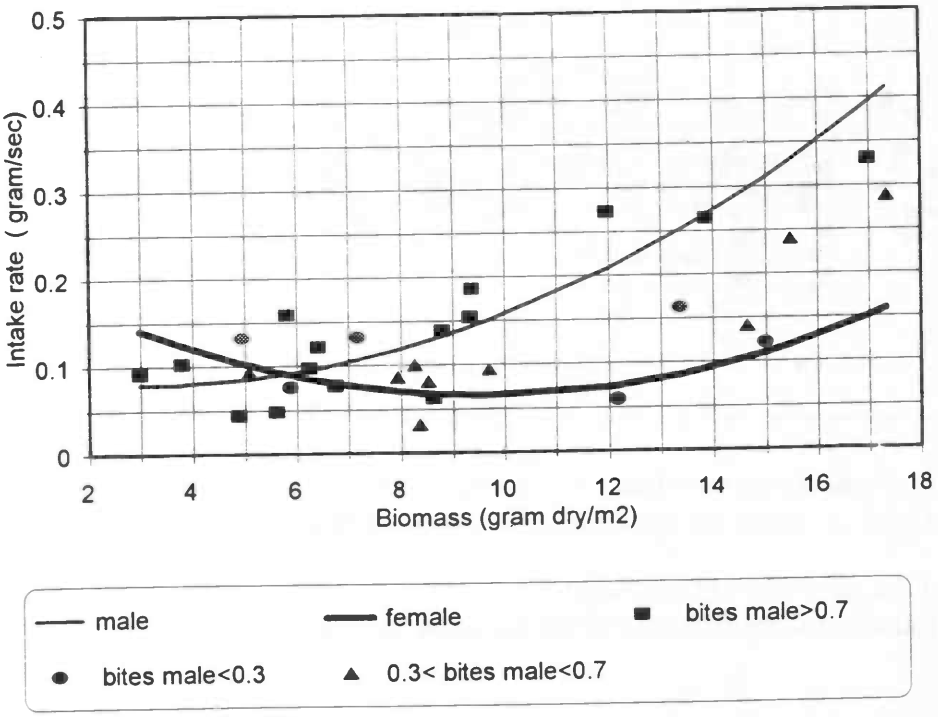

Figure 4 : Intake rate related to biomass, fraction of the bites made by the male and interaction between these variables.

North Coast of Groningen

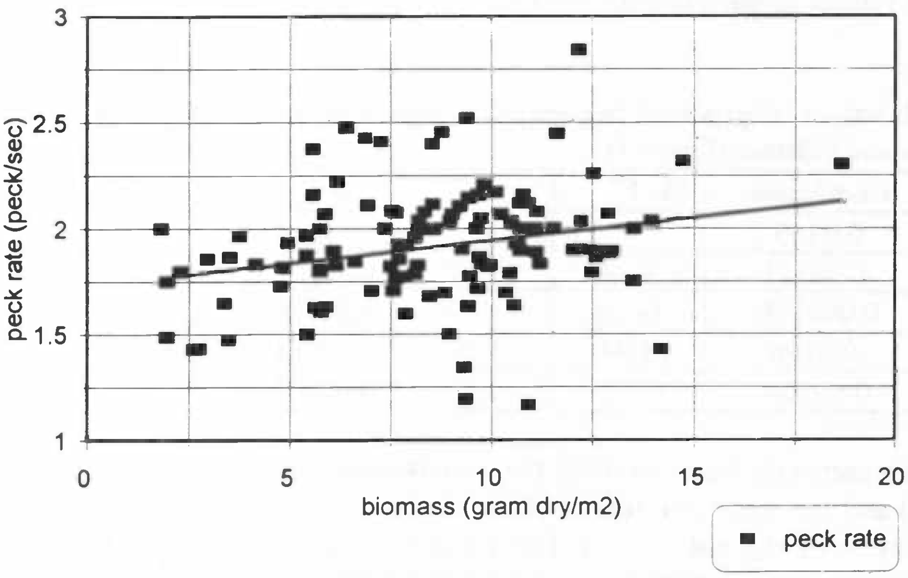

Figure 6 : Peck rate of the female related to biomass

The relation found between the peck rate of the female and biomass is a regression line whose equation is : $y = 0.0214 x + 1.73$, with $F(1,117)=7.55$, $p=0.0069$.

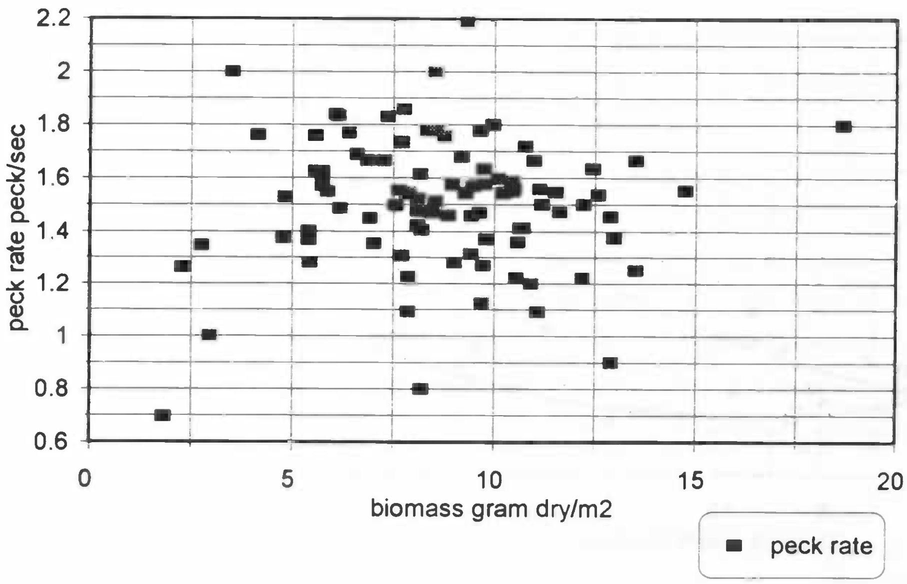

Figure 7 : Peck rate of the male related to biomass
No relation has been found between peck rate of the male and biomass

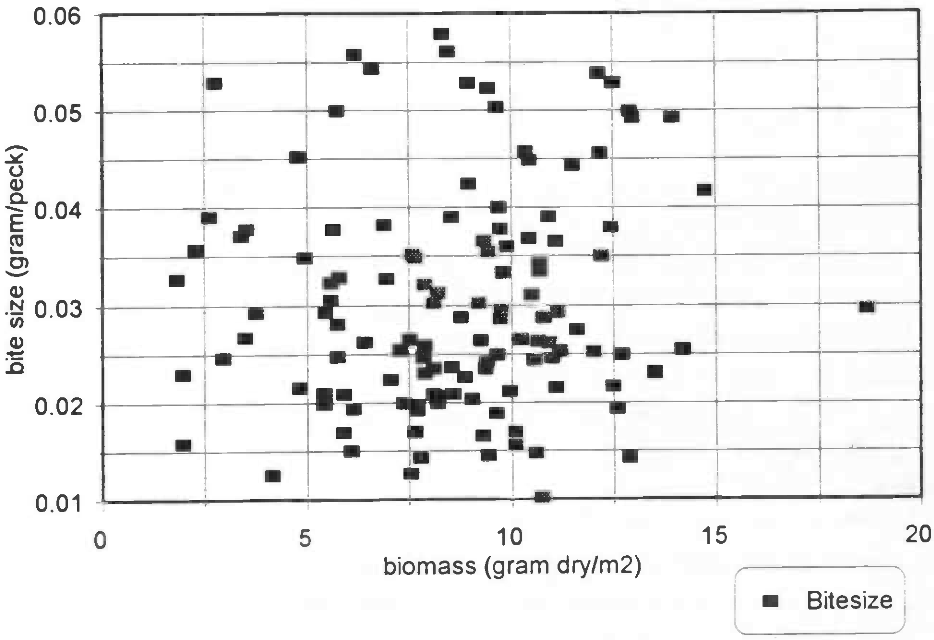

Figure 8 : Bite size related to biomass

No relation has been found between bite size and biomass

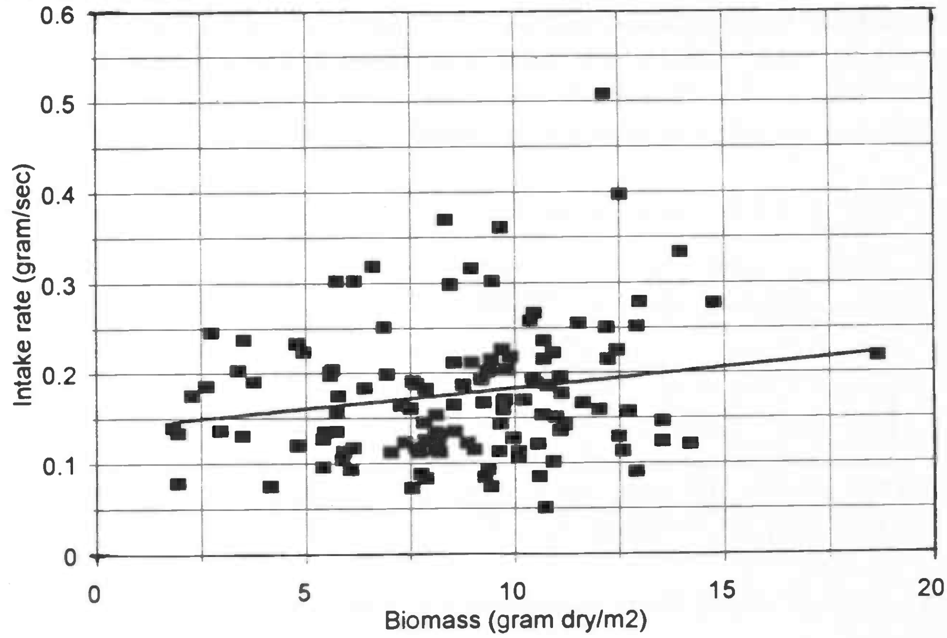

Figure 9 : Intake rate related to biomass

With the statistic test ANCOVA (procedure manova in spss), intake rate has been correlated with biomass. The equation of the positive relation found is $y = 0.0045x + 0.1379$ with $F(1,123)=4.46$ and $p=0.037$.

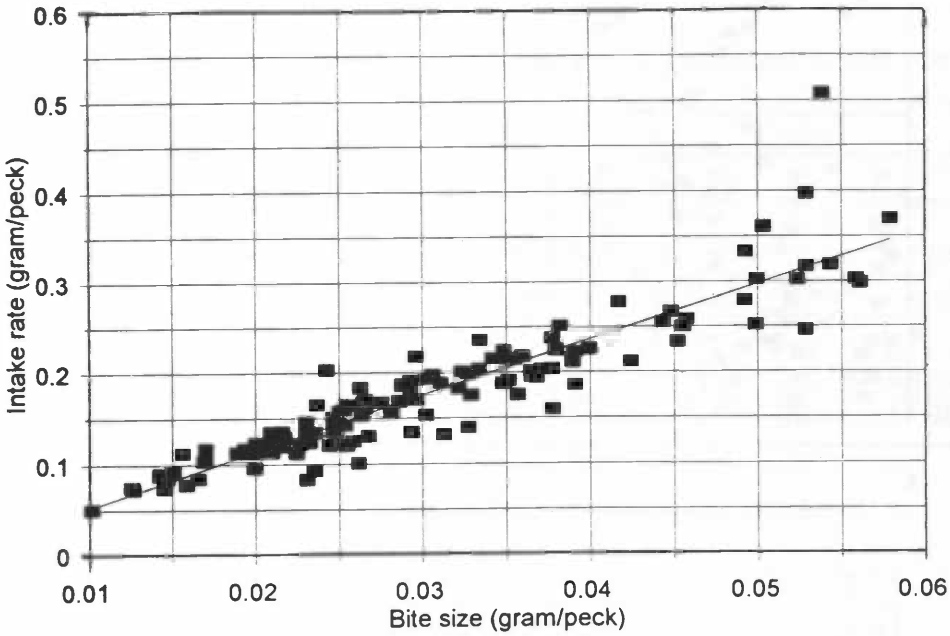

Figure 10 : Intake rate related to bite size.

The relation found between the intake rate and bite size is a regression line whose equation is : $y = 6.12\ x - 0.00853$, with $F(1,123)=678.18$, $p=0.0000$.

Different quality of the vegetation

We expected an effect of the quality of the vegetation (Trudell and White, 1981). In this section, this relation is not only investigated for the intake rate but also for the peck rate and the bite size which define intake rate. These components are analyzed separately. The results measured on turves from Schiermonnikoog and the North Coast are presented separately.
First the effect of biomass and quality is analyzed in a parametric ANCOVA to test significant effects. If there is no significant effect of biomass, the effect of treatment was again tested using a non parametric Kruskall Wallis ANOVA.

Schiermonnikoog

During the investigation in Schiermonnikoog, four treatments have been used:
Black : grazed and non fertilized
Green : ungrazed and fertilized
Red : ungrazed and non fertilized
Yellow : grazed and fertilized

As there is no significant effect of biomass on peck rate, bite size and intake rate (figure 11), when treatment was included in the model, the various treatments are compared non parametric with a Kruskall Wallis ANOVA.
The tables 3, 4, 5 and 6 give the mean, the standard error and the number of cases for respectively the peck rate of the female, of the male, for bite size and intake rate.

Table 3 : Mean, standard error and number of cases related to peck rate of the female for different treatments.

Treatments	Mean	Standard error	Cases
Black	1.966	0.0820	8
Green	2.078	0.0710	7
Red	1.86	0.0725	7
Yellow	2.006	0.0817	6

In fact, there is no significant difference in the peck rate of the female for the four different treatments (Kruskall Wallis : cases = 28, Chi-square = 3.66, p=0.299).

Table 4 : Mean, standard error and number of cases related to peck rate of the male for the different treatments.

Treatments	Mean	Standard error	Cases
Black	1.46	0.169	4
Green	1.73	0.0742	8
Red	1.71	0.155	6
Yellow	1.60	0.0131	4

In fact, there is no significant difference in the peck rate of the male for the four different treatments (Kruskall Wallis : cases = 22, Chi square = 2.48, p=0.478).

Table 5 : Mean, standard error and number of cases related to the bite size for the different treatments.

Treatments	Mean	Standard error	Cases
Black	0.0127	0.00201	8
Green	0.0379	0.00466	8
Red	0.0217	0.00304	8
Yellow	0.0160	0.00176	8

There is a significant difference between the bite size related to the vegetation belonging to the four different treatments (Kruskall Wallis : cases = 32, Chi square = 17.91, p=0.0005).

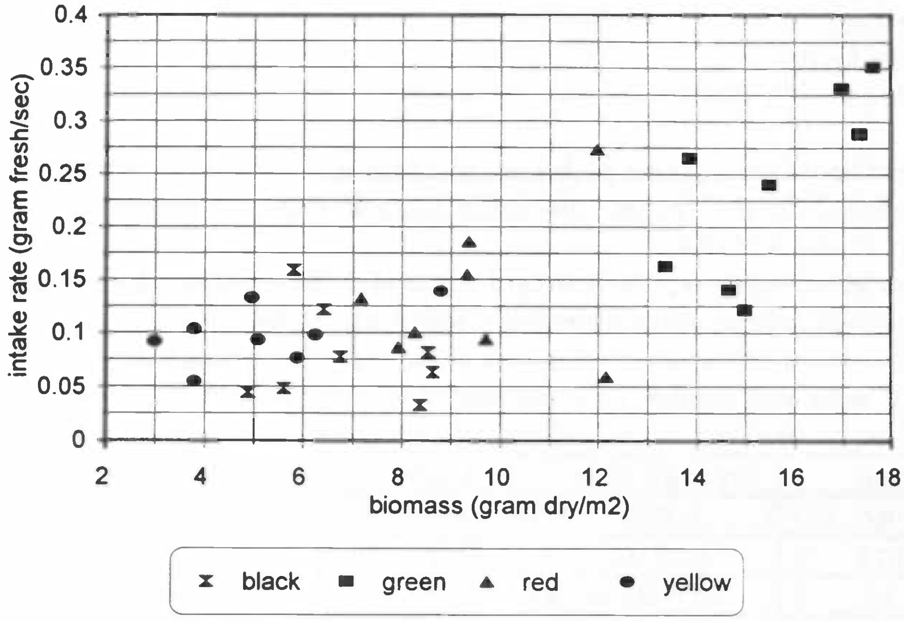

Figure 11 : Intake rate, according to the four different treatments, related to biomass

No relation has been found in order to relate the intake of the four different treatments to the biomass

Table 6 : Mean, standard error and number of cases related to the intake rate for the different treatments.

Treatments	Mean	Standard error	Cases
Black	0.0788	0.0150	8
Green	0.2378	0.0309	8
Red	0.1361	0.0242	8
Yellow	0.0987	0.00968	8

These last test shows that there is a significant difference between the intake rate for the four treatments (Kruskall Wallis : cases = 32, Chi square = 15.50, p=0.0014).

The treatment pairs green/yellow and black/red differ in biomass. So far this is not used in the analysis and no significant effect of biomass is found within the four treatments. Now we will lump the two pairs of treatment into two categories fertilized and unfertilized and analyze again the possible effect of biomass.

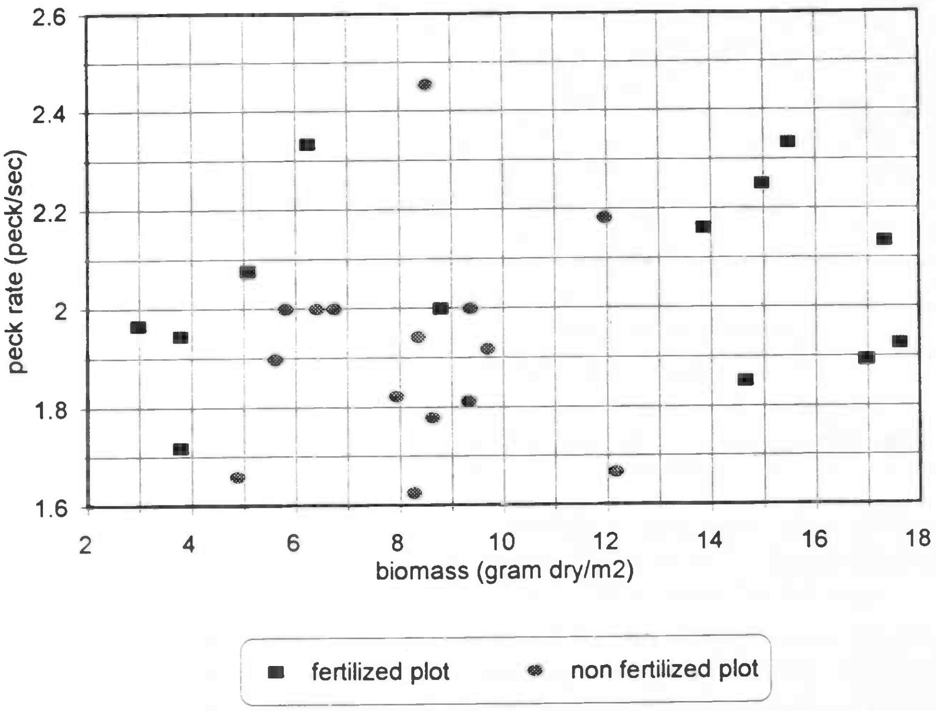

Figure 12 : Peck rate of the female, according to different quality of the vegetation (fertilized and non fertilized), related to biomass.

No relation has been found between peck rate of the female, according to the quality of the vegetation, and biomass. Table 7 gives us the mean, the standard error and the number of cases related to the peck rate of the female for the different quality of the vegetation.

Table 7 : Mean, standard error and number of cases related to peck rate of the female for the different quality of the vegetation.

Treatments	Mean	Standard error	Cases
Fertilized	2.04	0.0510	13
Non fertilized	1.91	0.0552	15

There is no significant difference between the peck rate of the female done on the fertilized vegetation and the one done on the non fertilized vegetation (Kruskall Wallis : cases = 28, Chi-square = 2.67, p=0.102)

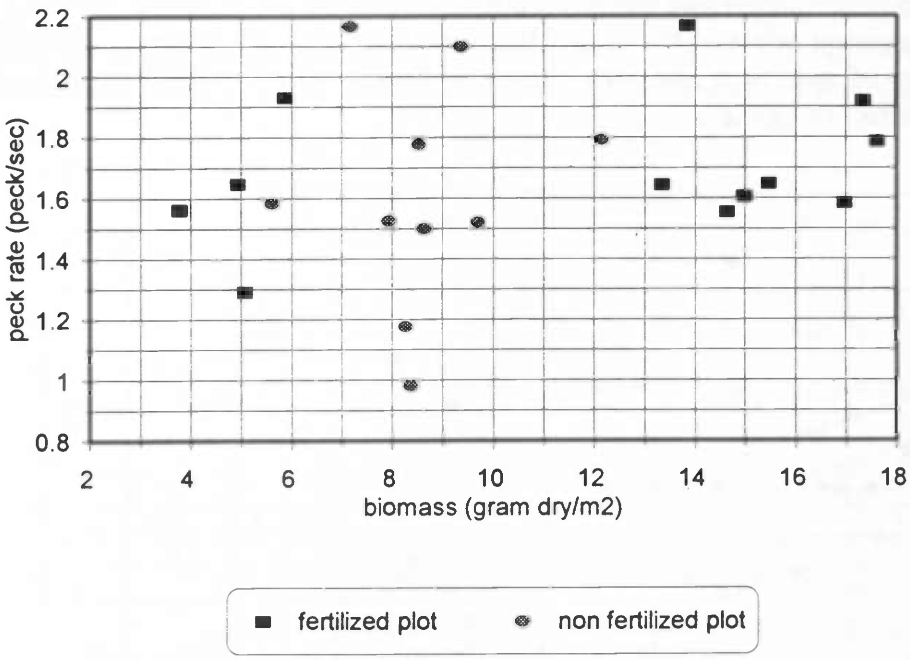

Figure 13 : Peck rate of the male, according to different quality of the vegetation (fertilized and non fertilized), related to biomass

No relation has been found between peck rate of the male, according to the different quality of the vegetation, and biomass. Table 8 gives us the mean, the standard error and the number of cases related to the peck rate of the female for the different quality of the vegetation.

Table 8 : Mean, standard error and number of cases related to peck rate of the male for the different quality of the vegetation.

Treatments	Mean	Standard error	Cases
Fertilized	1.695	0.0654	12
Non fertilized	1.612	0.116	10

There is no significant difference between the peck rate of the male done on the fertilized vegetation and the one done on the non fertilized vegetation (Kruskall Wallis : cases = 32, Chi-square = 0.8522, p=0.3559).

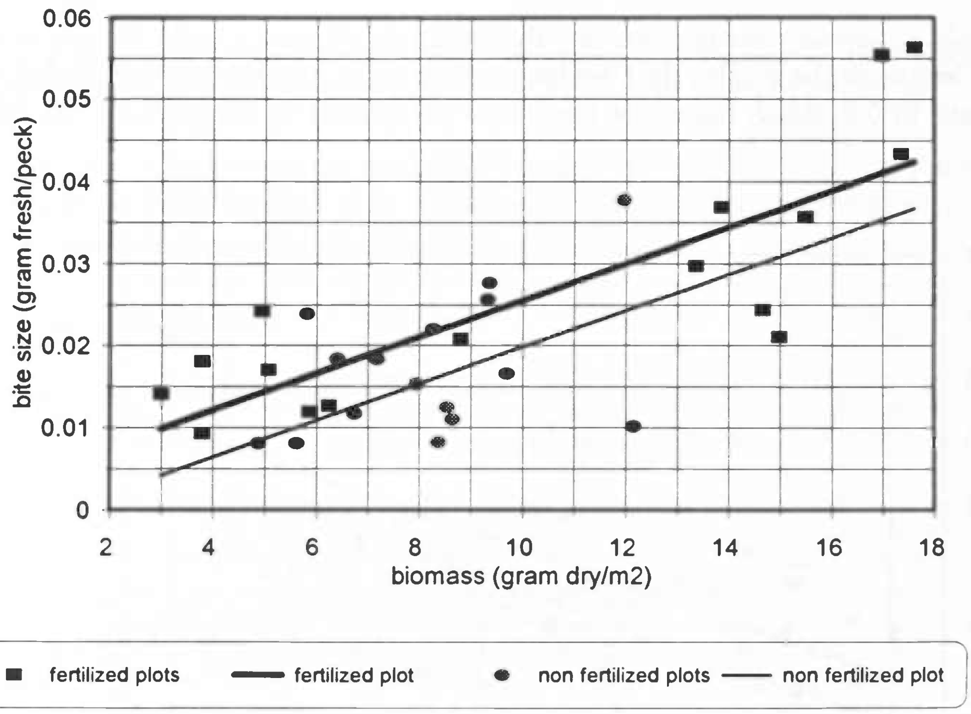

Figure 14 : Bite size, according to the different quality of the vegetation (fertilized and non fertilized), related to biomass and fraction of bites made by the male.

With the ANCOVA test (manova procedure in spss), for each quality of the vegetation, nearly significant positive relation ($p<0.1$) has been found relating bite size with biomass and fraction of bites made by the male. With a corresponding to biomass and b to the fraction of bite made by the male, the relations found are:
for the fertilized plot, $y = -0.00343+ 00284+0.00223\ a +0.00753\ b$,
for the non fertilized plot, $y = -0.00343- 00284+0.00223\ a +0.00753\ b$.
The table 9 gives the coefficients related with the relations found.

Table 9 : Coefficients, F values, degrees of freedom and significance corresponding to the relation between bite size and biomass (figure 14)

Variables	Coefficient	F	df	P
Constant	-0.00343			
Biomass	0.00223	42.73	1,28	0.000
Bite male	0.00753	3.14	1,28	0.087
Fertilization factor		3.89	1,28	0.048
Fertilized plot	+0.00284			
Non fertilized plot	- 0.00284			

There is a significant difference between the bite size related to the fertilized and non fertilized plots (Mann and Whitney, cases=32, Chi-square=4.14 and p=0.0418)

The rectangular points represent the bite size for the fertilized vegetation and the circle one the bite size for the non fertilized vegetation. These bite size has been calculated according with the measurements done during the investigation.

For the graphs concerning the bite size and the intake rate (figure 13 and 14) and in order to simplify the lecture of the graphs, the lines have been created with the fraction of bites made by the male equal to 0.5, which mean that number of pecks done by the male and the female are equal.

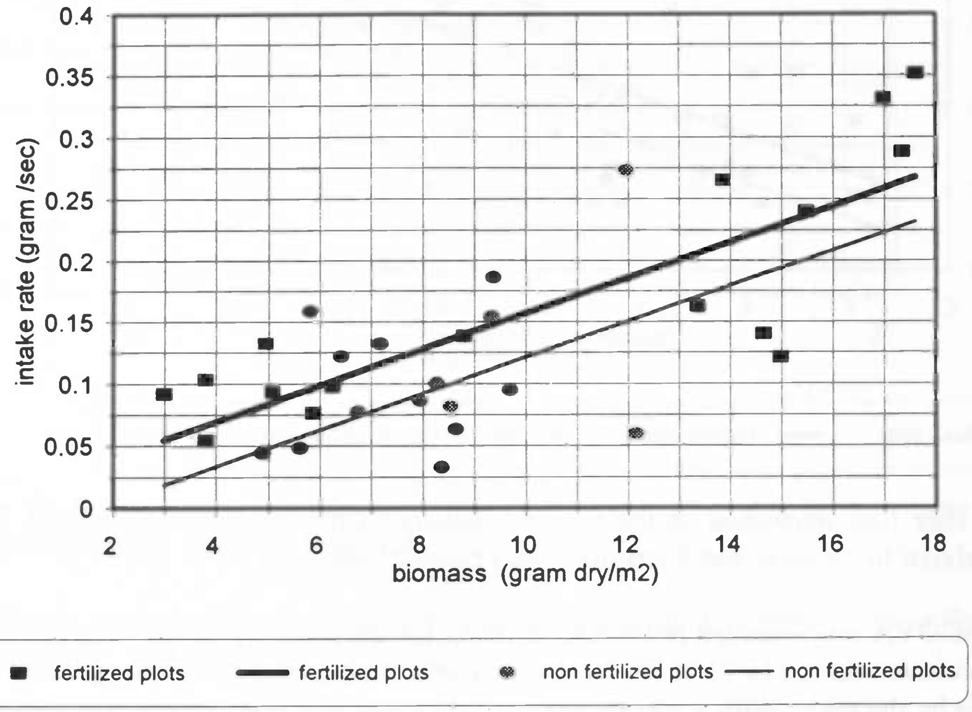

Figure 15 : Intake rate, according to the different quality of the vegetation (fertilized and non fertilized), related to the biomass and the fraction of bites made by the male.

With the ANCOVA test (manova procedure in spss), for each quality of the vegetation a nearly significant positive relation ($p<0.1$) has been found in order to correlate the intake rate with biomass and the fraction of bites made by the male. With a corresponding to biomass and b to the fraction of bite made by the male, the relations found are:

for the fertilized vegetation, $y = -0.0391+0.0178+0.0146\ a +0{,}0641\ b$,

for the non fertilized plot, $y = -0.0391- 0.0178+0.0146\ a +0.0641\ b$

The table 10 gives the coefficients related with the relations found.

Table 10 : Coefficients, F values, degrees of freedom and significance corresponding to the relation between intake rate and biomass (figure 15)

Variables	Coefficient	F	df	P
Constant	-0.0391	1.53	1.28	0.226
Biomass	0.0146	40.45	1,28	0.000
Bite male	0.0641	4.99	1,28	0.034
Fertilization factor		3.37	1,28	0.077
Fertilized plot	0.0178			
Non fertilized plot	- 0.0178			

There is a significant difference between the intake rate related to the fertilized and non fertilized plots (Mann and Whitney : cases=32, Chi-square=3.99 and p=0.0458).

The rectangular points represent the intake rate for the fertilized plot and the circle one the intake rate for the non fertilized plot. These intake rate has been calculated according with the measurements done during the investigation.

North Coast of Groningen

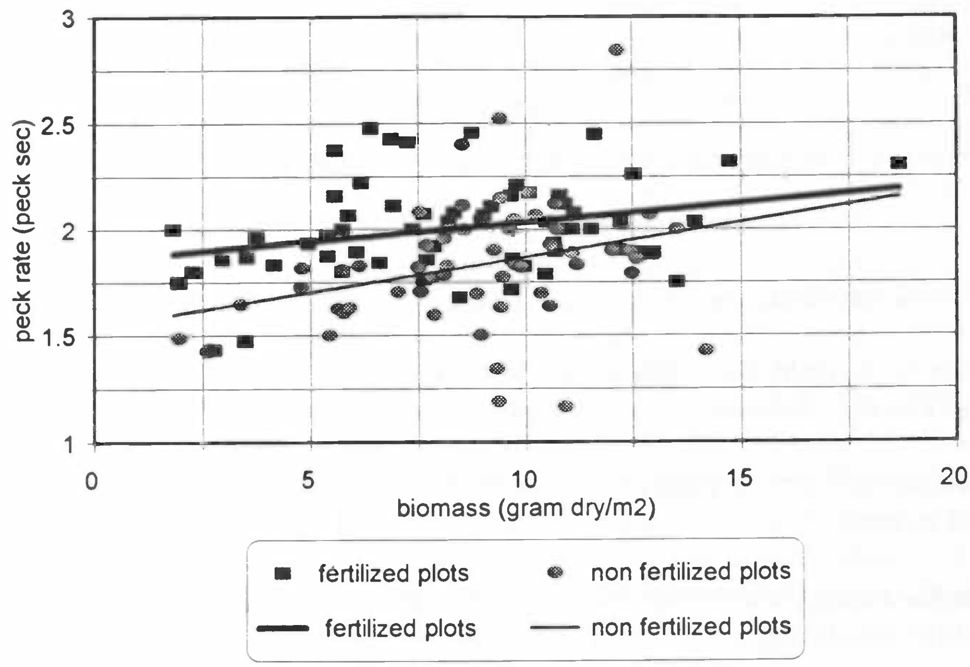

Figure 16 : Peck rate of the female, according to the different quality of the vegetation (fertilized and not fertilized), related to biomass.

The thicker regression line correlate the peck rate of the female for the fertilized plots with the biomass, its equation is : $y = 0.0182\ x + 1.851$. The thinner one correlated the non fertilized plots with the biomass, its equation is : $y=0.0331\ x + 1.537$.
The table 11 gives the coefficients related with the relations found.

Table 11 : Coefficients, F values, degrees of freedom and significance corresponding to the relation between peck rate and biomass (figure 16)

Variables	Coefficient	F	df	P
Fertilized plots				
Constant	1.851			
Biomass	0.0182	5.55	1,61	0.0213
Non fertilized plots				
Constant	1.537			
Biomass	0.0331	5.27	1,54	0.0255

The rectangular points represent the peck rate for the fertilized vegetation and the circle one the peck rate for non fertilized vegetation, they are both based on the measurements done during the investigation.

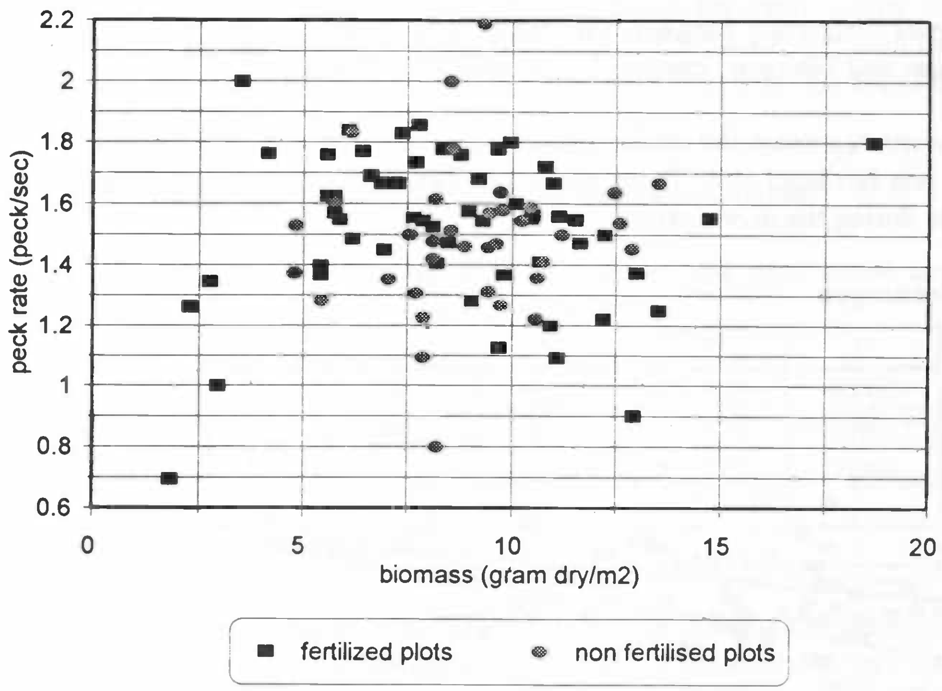

Figure 17: **Peck rate of the male, according to the different quality of the vegetation (fertilized and not fertilized), related to biomass.**

No relation has been found between peck rate of the male, according to the different quality of the vegetation, and biomass.

The table 12 gives the mean, the standard error related to the peck rate of the female for the different quality of the vegetation.

Table 12 : **Mean, standard error and number of cases related to peck rate of the male for the different quality of the vegetation (figure 17).**

Treatments	Mean	Standard error	Cases
Fertilized	1.52	0.0338	56
Non fertilized	1.48	0.0395	37

There is no significant difference between the peck rate of the male done on the fertilized vegetation and the one done on the non fertilized vegetation (Mann Whitney:U=871.5, W=1574.5, z = -1.29, 2-tailed p=0.1966).

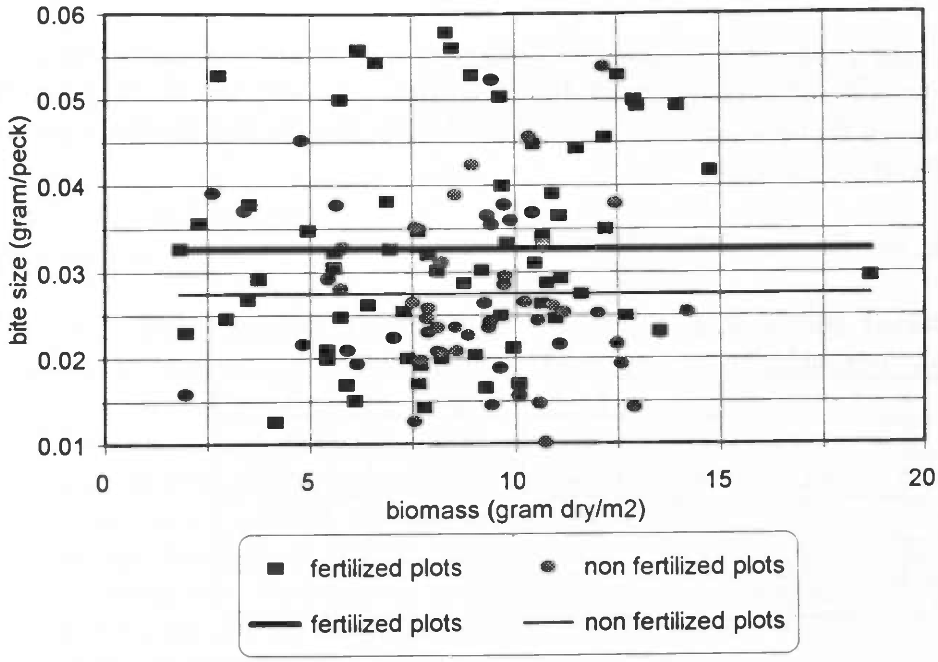

Figure 18 : Bite size, according to the different quality of the vegetation (fertilized and non fertilized), related to biomass

With the ANCOVA test (manova procedure in spss), for each quality of the vegetation a linear relation has been found in order to correlate the bite size with the biomass. For the fertilized plot, the relation found is : y=0.0301+0.00255; for the non fertilized plot the relation is y=0.00301-0.00255; with for the fertilization factor F(1,123)=6.76 and p=0.010,.
The rectangular points represent the bite size for the fertilized vegetation and the circle one the bite size for the non fertilized vegetation. These bite size has been calculated according to the measurements done during the investigation.

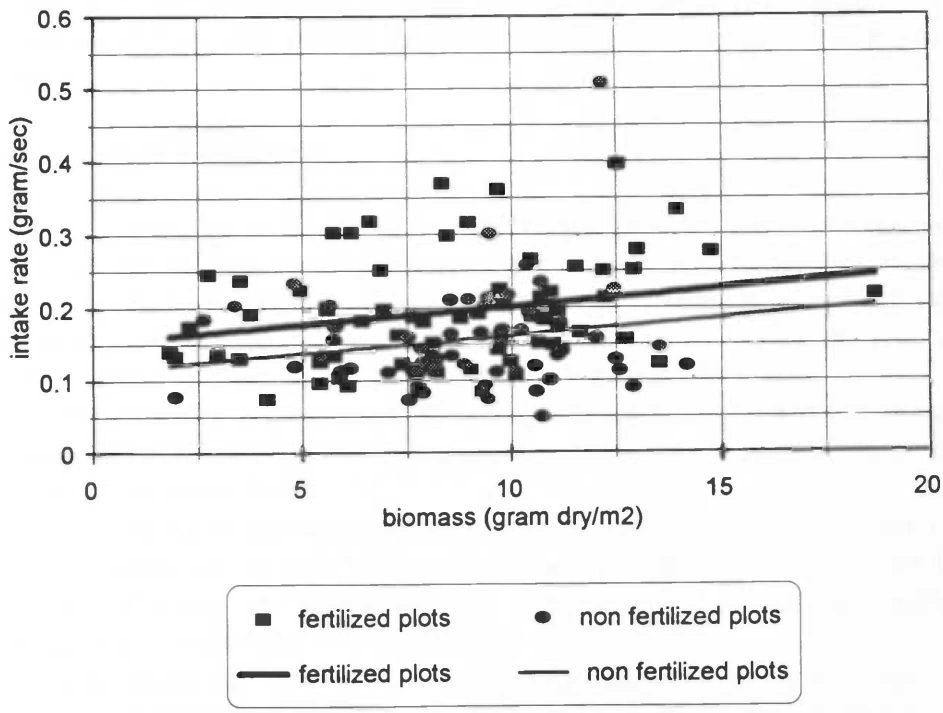

Figure 19 : Intake rate, according to the different quality of the vegetation (fertilized and non fertilized), related to biomass.

With the ANCOVA test (manova procedure in spss), for each quality of the vegetation a positive relation has been found in order to correlate the intake rate with the biomass. For the fertilized plot, the relation found is :y = 0.0049x+0.133+0.0199; for the non fertilized plot the relation is y = 0.0049x+0.133-0.0199

The table 13 gives the coefficients related with the relations found.

Table 13 : Coefficients, F values, degrees of freedom and significance corresponding to the relation between intake rate and biomass (figure 19)

Variables	Coefficient	F	df	P
Constant	0.133	47.56	1,122	0.000
Biomass	0.0049	5.56	1,122	0.0020
Fertilization factor		9.70	1,122	0.002
Fertilized plots	0.0199			
Non fertilized plots	-0.0199			

The rectangular points represent the intake rate for the fertilized vegetation and the circle one the intake rate for the non fertilized vegetation. These intake rate has been calculated according to the measurements done during the investigation.

Discussion

Relation with biomass

Schiermonnikoog

During our investigation, contrary to our expectations, the peck rate of both of the geese did not depend on biomass (figures 1 and 2). This results is mainly due to the large variation in pecking behaviour of the geese.

The bite size is related to the biomass, the fraction of bites made by the male and the interaction between the biomass and the fraction of bites made by the male. As we expected, bite size presents a positive relation with biomass (figure 3). In deed, for the same pecking effort, a high biomass allows an higher intake. The individual feeding behavior, which is partially translated by the bite size, is worth noticing. [At low biomass the bite size of the male is lower than the one of the female, but at higher biomass the bite size of the male is the highest.] The male seems to be more sensitive to an increase on biomass At high biomass, he is able to get more grass than the female.

As J.Trudell and RG. White demonstrated and as we expected, the intake rate is dependent on biomass, the fraction of bites made by the male and the interaction between the biomass and the fraction of bites made by the male (figure 4). The intake rate of both of the birds presents a positive quadratic relation with the biomass, which is the expected relation. At low biomass, the intake rate of the male is lower than the intake rate of the female but at higher biomass the intake rate of the male is the highest one. At high biomass, geese are able to get more food in a shorter time.

The intake rate and its variations with biomass are caused by the bite size, which represents the quantity of food per unit of peck (figure 5).Intake rate of herbivores increases as a function of bite size(Gross, Shipley, Hobbs, Spalinger and Wunder, 1993). The range of biomass used does not permit to determine if the intake rate presents a optimum at high biomass

North Coast of Groningen

The peck rate of the female presents a positive relation with biomass, this correlation is the one expected. The pecking effort of the female is motivated by the biomass (figure 6). Contrary to our expectations, no relation has been found between peck rate of the male and biomass (figure 7). However it is important to know that during the investigation it has been noticed that the pecking behaviour of the male was very fluctuating.

We expected a positive relation between the bite size and the biomass but no relation has been found (figure 8). The quantity of food got per peck is not dependent on biomass in the range of variation used.

According to our expectations, the intake rate is positively related to biomass (figure 9). As we expected, at high biomass geese are able to get quickly more food, their pecking effort is higher and motivated by high biomass. Food intake rate increased linearly with standing crop (Trudell and White, 1981).

The intake rate and its variations are defined by the bite size (figure 10).The range of biomass used does not permit to determine if the intake rate presents a optimum at high biomass

Different quality of the vegetation

Schiermonnikoog

For the different qualities of the vegetation, the peck rates of both of the geese do not dependent on biomass (figure 12 and 13). The test of Kruskall Wallis demonstrates that there is no significant difference between the peck rate related with the fertilized and non fertilized vegetation. The quality of the vegetation does not influence the peck rate.

The bite size is nearly significantly related to biomass and to the fraction of bites made by the male for the two different qualities of vegetation ($p<0.1$, figure 14). As we expected, the fertilization of the vegetation brings about the increase of the bite size.

As we expected, for the two different qualities of the vegetation the intake rate presents a positive linear relation with the biomass and it is higher for the fertilized vegetation (figure 15). Our results correlated the one got by J. Trudell and RG. White who demonstrated that food quality and eating rate of herbivores are interrelated. Biomass has to be 2.5 gram higher in non fertilized plots to compensate for the fertilization effects. The intake rate of the geese is nearly defined by the fertilization and by the biomass. Nevertheless, there is no interaction between the quality and the biomass.

North Coast of Groningen

For the different qualities of the vegetation, the intake rate of the female presents a positive linear relation with biomass (figure 16). Moreover, according to our expectations, the peck rate of the female for the fertilized vegetation is higher. Nevertheless at high biomass (20 gram dry per square meter) the peck rate for fertilized and non fertilized vegetation are similar. This could mean that the high biomass satisfies to motivate the feeding effort of the geese; an other explanation can be that the difference between the fertilized and non fertilized vegetation is not sufficient. Contrary to our expectations, no relation has been found to relate the peck rate of the male with the biomass for the different quality of the vegetation (figure 17). The test of Mann and Whitney demonstrates that the peck rate is not significantly different between the fertilized and non fertilized plots.

A constant relation between bite size, on fertilized and non fertilized vegetation, and biomass has been found (figure 18). However, as expected, the bite size related to the fertilized vegetation is the highest one. The fertilization allowed the geese to improve their intake without increasing the pecking effort.

For each quality of the vegetation, a positive relation correlates the intake rate to the biomass (figure 19). According to our expectations, the intake rate related to the high quality of the grass is the highest one. Biomass has to be 7.5 gram higher in non fertilized plots to compensate the effects of the fertilization. The fertilization and plant biomass seem to determinate the level of the intake rate.

Intake rate declines as food quality declines. In this project, no quality measures have been done. However, we can apologize that fertilized turves presented a higher contain of protein and nitrogen. This nutritional characteristics probably motivate the geese feeding. On the other hand, it has been noticed that the color of the fertilized plots was darker than the non fertilized one.
The bite size done on the fertilized vegetation was higher and probably due to the structural characteristics of the leave which were softer. No conclusions can be given concerning this effects but an other project should be done to determine how the quality of the vegetation affects bite size and intake rate.

Conclusions

A positive relation links the intake rate with the biomass. As expected, when depletion occurred, a decrease of the intake rate has been measured. The variations of intake rate are mainly defined by the fluctuations of the bite size.

The intake rate is also dependent on the quality of the vegetation, in this study defined as fertilization of the turves. For a higher quality of the vegetation, the intake rate is higher. Nevertheless, the slopes of the lines, of fertilized and non fertilized plots, relating intake rate to biomass are similar.

Finally, it has not been possible to determine if intake rate is more defined by the biomass or by the quality of the vegetation.

RELEVANCE OF THE RESULTS

This experiment took place in a larger project which involves a lot of researchers and students. The aim of this global project is to define the carrying capacity of the Wadden Sea for the Brent Geese under different management regimes. Brent geese used several habitat types which have been changing in recent years. By using agricultural fields and arable lands, Brent geese are in conflict with farmers and a large range of money is paid to compensate the damage for crop loss (Dutch Society for the Preservation of the Wadden Sea, 1994). The aim of the project is to understand the habitat selection of the Bent Geese, based on the dynamic interplay between nutritional requirements, production and depletion over a large range of habitats (Drent and Bakker, 1996).

The choice of the habitat dependents on multiple factors as vegetation characteristics, disturbance, safety of the area, climatic conditions. The factor taken into account in this investigation is the vegetation and more precisely the intake rate. The intake rate is related to the vegetation species, the biomass available, the quality of the vegetation, the plant density and the vegetation structure. For this project, we only investigated the influence of the biomass and of the quality of the vegetation on the intake rate. The vegetation tested is the *Puccinellia maritima* from salt-marshes of Schiermonnikoog and the North Coast of Groningen.

RECOMMENDATION

During this research, the intake rate of the Brent Geese has been measured and put in relation with biomass and quality of the vegetation. Nevertheless, many other variables affect the intake rate. With the same method it will be relevant to investigate the influence of other variables as plant density, salt content, structure of the vegetation, amount of dead material and seasonal changes of the leaves. A very detailed investigation of quality on the vegetation should give more information about nutritional characteristics explaining food preferences of the geese. In this study the biomass and the fertilization were the key factors which explain the preference.

The plant species tested was *Puccinellia maritima* but it should be sensible to use the same method to test other species as *Festuca rubra, Triglochin maritima* or *Plantago maritima*. Variation in peck rate, bite size and intake rate between those species could be detected.

Fluctuations of intake rate are a complicated phenomena which is influenced by a large range of variables.

Recommendations about the set up of the research:

* The intake rate must be measured in a laboratory
* The turves must be more homogeneous : they must present only one species and have similar biomass and plant density. The size of the turves must always be exactly the same.
* The turves have to be tested as soon as possible otherwise, even by keeping them in the cold room, the vegetation characteristics change.
* The fights between the geese and the dominance phenomena should be avoid : a solution can be to run the experiment in double and to use one geese per room.
* To get good data, the characteristics which are tested should present a large range of variations and the researcher should increase the number of samples as much as possible.
* To get exact data to calculate the bite size and the intake rate of each goose, it is necessary to allow feeding only by one goose on each turf.
* A detailed study should be done to determinate which characteristics of the fertilized vegetation allow the increase of bite size and intake rate.

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Thanks to all the people forming the goose team for your friendly welcome. Sorry to oblige you to speak in English.

I really enjoy this experiment and its nice working atmosphere. I learnt a lot about the running of an experiment, Brent geese and statistical analysis.

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LIST OF APPENDIXES

APPE NDIX 1

Nb of turf	W evap	T evap	Int,eva	In,ev,los	evap-fee	otal evap	Intake g	Dry W G1	Dry W #1	W bags	Dry WG2	Dry W#2	Perc of #	M nb peck	M feed T
1ba	0.1	327	1.03	1.03	302	0.092355	0.937645	4.32	2.34	1.75	2.57	0.59	18.67089	48	103
1ga	0.23	302	3.03	2.69	280	0.213245	2.476755	5.92	2.34	1.75	4.17	0.59	12.39496	13	13
1ra	0.1	307	0.76	0.7	331	0.107818	0.592182	5.41	1.75	1.75	3.66	0	0	43	136
1ya	0.13	331	1.32	1.32	272	0.106828	1.213172	2.89	2.18	1.75	1.14	0.43	27.38854	0	
f1ba	0.17	284	0.94	0.92	324	0.193944	0.726056	3.78	1.75	1.75	2.03	0	0	0	
f1ga	0.16	271	3.76	2.89	237	0.139926	2.750074	6.41	1.75	1.75	4.66	0	0	28	31
f1ra	0.13	260	1.51	1.43	406	0.203	1.227	4.14	1.75	1.75	2.39	0	0	29	90
f1ya	0.18	303	0.88	0.83	270	0.160396	0.669604	3.52	1.75	1.75	1.77	0	0	56	48
2ba	0	251	0.73	0.55	505	0	0.55	4	3.11	2.53	1.47	0.58	28.29268	0	
2ga	0.11	280	1.83	1.67	434	0.1705	1.4995	7.04	2.53	2.53	4.51	0	0	53	59
2ra	0.15	411	5.35	2.9	1	0.88	2.02	5.35	2.9	2.53	2.82	0.37	11.59875	21	57
2ya	0.09	247	1.77	1.71	283	0.103117	1.606883	4.06	3.38	2.53	1.53	0.85	35.71429	40	58
3ba	0.16	450	0.98	0.92	577	0.205156	0.714844	5.05	2.99	2.53	2.52	0.46	15.43624	54	131
3ga	0.09	374	2.59	2.03	529	0.127299	1.902701	6.94	2.53	2.53	4.41	0	0	28	39
3ra	0.19	405	1.48	1.48	290	0.136049	1.343951	5.45	2.53	2.53	2.92	0	0	35	67
3ya	0.16	313	1.77	1.34	251	0.128307	1.211693	5.18	3.44	2.53	2.65	0.91	25.5618	0	
1bb	0.14	305	1.13	1.06	434	0.199213	0.860787	3.32	1.93	1.75	1.75	0.18	9.326425	0	
1gb	0.14	300	3.89	3.62	311	0.145133	3.474867	6.97	2.11	1.75	5.22	0.36	6.451613	48	58
1rb	0.1	255	0.58	0.58	260	0.101961	0.478039	3.91	2.13	1.75	2.16	0.38	14.96063	26	225
1yb	0.15	254	1.06	0.98	300	0.177165	0.802835	2.65	2.17	1.75	0.9	0.42	31.81818	0	
f1bb	0.15	309	1.02	0.85	453	0.219903	0.630097	4.35	1.83	1.75	2.6	0.08	2.985075	9	20
f1gb	0.23	319	2.23	2.03	707	0.509749	1.520251	5.77	1.75	1.75	4.02	0	0	51	1118
f1rb	0.22	302	1.15	1.08	239	0.174106	0.905894	5.35	1.75	1.75	3.6	0	0		
f1yb	0.02	243	0.88	0.82	286	0.023539	0.796461	3.63	1.75	1.75	1.88	0	0	0	
2bb	0.12	305	0.9	0.74	357	0.140459	0.599541	4.24	3	2.55	1.69	0.45	21.02804	19	104
2gb	0.45	510	4.87	4.63	329	0.290294	4.339706	7.85	2.73	2.55	5.3	0.18	3.284672	25	35
2rb	0.16	335	1.89	1.63	300	0.143284	1.486716	5.36	2.7	2.55	2.81	0.15	5.067568	0	
2yb	0.13	216	1.38	1.32	332	0.199815	1.120185	3.69	2.63	2.55	1.14	0.08	6.557377	50	59
3bb	0.26	250	1.5	1.36	283	0.29432	1.06568	4.48	2.75	2.55	1.93	0.2	9.389671	0	
3gb	0.26	245	4.55	4.31	300	0.318367	3.991633	7.66	2.55	2.55	5.11	0	0	19	27
3rb	0.12	245	2.65	2.35	340	0.166531	2.183469	5.04	2.95	2.55	2.49	0.4	13.84083	47	82
3yb	0.24	352	1.59	1.55	284	0.193636	1.356364	4.04	2.55	2.55	1.49	0	0	56	54

Nb of turf	M peck T	M proc T	Head u	Mpeckrate	F nb peck	F feed T	F peck T	F proc T	F head up	Fpeckrate	Total peck	Bite size	rass intak	bites male	Biomass
1ba	27	5	17	1.777778	27	60	11	3	9	2.454545	75	0.012502	0.081976	0.64	8.538206
1ga	6	1	3	2.166667	54	39	25	6	9	2.16	67	0.036966	0.265433	0.19403	13.85382
1ra	24	6	24	1.791667	15	21	9	0	4	1.666667	58	0.01021	0.059618	0.741379	12.15947
1ya				ERR	67	49	39	8	7	1.717949	67	0.018107	0.103345	0	3.787375
f1ba				ERR	62	89	31	7	9	2	62	0.011711	0.077811	0	6.744186
f1ga	17	8	9	1.647059	49	29	21	5	10	2.333333	77	0.035715	0.240433	0.363636	15.48173
f1ra	19	0	13	1.526316	51	67	28	5	7	1.821429	80	0.015338	0.086732	0.3625	7.940199
f1ya	29	2	4	1.931034						ERR	56	0.011957	0.07671	1	5.880399
2ba				ERR	68	145	41	5	9	1.658537	68	0.008088	0.044567	0	4.883721
2ga	33	3	18	1.606061	18	8	8	0	0	2.25	71	0.02112	0.121506	0.746479	14.98339
2ra	10	2	12	2.1	52	54	26	3	7	2	73	0.027671	0.186416	0.287671	9.368771
2ya	31	6	13	1.290323	54	30	26	2	1	2.076923	94	0.017094	0.093658	0.425532	5.083056
3ba	55	13	28	0.981818	33	35	17	4	7	1.941176	87	0.008217	0.032985	0.62069	8.372093
3ga	18	7	8	1.555556	50	32	27	0	2	1.851852	78	0.024394	0.140473	0.358974	14.65116
3ra	23	4	13	1.521739	46	42	24	3	7	1.916667	81	0.016592	0.094999	0.432099	9.700997
3ya				ERR	58	36	29	4	13	2	58	0.020891	0.138812	0	8.803987
1bb				ERR	36	43	18	2	5	2	36	0.023911	0.158875	0	5.813953
1gb	25	3	14	1.92	32	32	15	1	4	2.133333	80	0.043436	0.28861	0.6	17.34219
1rb	12	0	20	2.166667						ERR	26	0.018386	0.132348	1	7.17608
1yb				ERR	57	43	29	3	4	1.965517	57	0.014085	0.091973	0	2.990033
f1bb	6	0	4	1.5	48	56	27	2	5	1.777778	57	0.011054	0.063435	0.157895	8.637874
f1gb	31	4	16	1.645161						ERR	51	0.029809	0.162925	1	13.35548
f1rb				ERR	24	36	11	2	5	2.181818	24	0.037746	0.273601	0	11.96013
f1yb				ERR	63	51	27	0	7	2.333333	63	0.012642	0.098002	0	6.245847
2bb	12	0	12	1.583333	55	60	29	5	8	1.896552	74	0.008102	0.048581	0.256757	5.614618
2gb	14	6	9	1.785714	52	30	27	12	3	1.925926	77	0.05636	0.351649	0.324675	17.60797
2rb				ERR	58	65	32	0	4	1.8125	58	0.025633	0.154352	0	9.335548
2yb	32	2	9	1.5625	70	48	36	9	3	1.944444	120	0.009335	0.054729	0.416667	3.787375
3bb				ERR	58	36	29	0	4	2	58	0.018374	0.122085	0	6.41196
3gb	12	4	8	1.583333	53	29	28	0	1	1.892857	72	0.055439	0.331531	0.263889	16.97674
3rb	40	0	12	1.175	52	104	32	5	9	1.625	99	0.022055	0.100751	0.474747	8.272425
3yb	34	2	7	1.647059						ERR	56	0.024221	0.132535	1	4.950166

APPE NDIX 2

Nb of turf	nb block	site	E/F	W evap	T evap	Int,eva	In,ev,lo	evap-fee	otal evap	Intake g	Dry W G1	Dry W #1	W bags	Dry WG2	Dry W#2
17	K2	R1	E	0.12	285	3.23	3.08	409	0.172211	2.907789	5.41	1.75	1.75	3.66	0
18	K2	R2	E	0.23	362	1.75	1.6	303	0.192514	1.407486	4.58	1.75	1.75	2.83	0
19	K2	L1	F	0.28	435	1.89	1.77	690	0.444138	1.325862	5.58	1.75	1.75	3.83	0
20	K2	L2	F	0.24	600	2.7	1.99	274	0.1096	1.8804	4.97	1.75	1.75	3.22	0
21	K2	L1	F	0.2	305	2.07	1.95	300	0.196721	1.753279	4.19	1.75	1.75	2.44	0
22	K2	L2	F	0.1	286	2.61	2.42	288	0.100699	2.319301	3.94	1.75	1.75	2.19	0
23	K2	L1	F	0.16	279	3.39	2.99	319	0.182939	2.807061	5.25	1.75	1.75	3.5	0
24	K2	L2	F	0.17	274	2.77	2.56	503	0.31208	2.24792	4.39	1.75	1.75	2.64	0
25	K3	L1	F	0.1	218	3.61	3.32	298	0.136697	3.183303	4.12	1.75	1.75	2.37	0
26	K3	L2	F	0.08	252	1.66	1.35	310	0.098413	1.251587	4.07	1.75	1.75	2.32	0
27	K3	R1	E	0.3	583	4.09	3.56	314	0.161578	3.398422	4.56	1.75	1.75	2.81	0
28	K3	R2	E	0.05	312	2.29	1.79	283	0.045353	1.744647	4.19	1.75	1.75	2.44	0
29	K3	R1	E	0.18	442	3.87	3.4	268	0.10914	3.29086	4.68	1.75	1.75	2.93	0
30	K3	R2	E	0.37	226	2.6	2.35	235	0.384735	1.965265	4.68	1.75	1.75	2.93	0
31	K3	L1	F	0.19	378	2.06	1.96	276	0.13873	1.82127	3.97	1.75	1.75	2.22	0
32	K3	L2	F	0.29	301	1.12	1.09	254	0.244718	0.845282	4.55	1.75	1.75	2.8	0
33	K3	L1	F	0.21	370	1.69	1.52	325	0.184459	1.335541	3.38	1.75	1.75	1.63	0
34	K3	L2	F	0.2	295	1.14	1.12	248	0.168136	0.951864	4.05	1.75	1.75	2.3	0
35	K3	R1	E	0.35	420	2.13	1.99	260	0.216667	1.773333	4.97	1.75	1.75	3.22	0
36	K3	R2	E	0.28	309	2.81	2.73	347	0.314434	2.415566	4.32	1.75	1.75	2.57	0
37	K3	L1	F	0.22	301	3.37	2.83	253	0.184917	2.645083	4.9	1.75	1.75	3.15	0
38	K3	L2	F	0.38	270	5.6	4.36	262	0.368741	3.991259	5.22	1.75	1.75	3.47	0
39	K3	R1	E	0.19	242	2.05	1.86	381	0.299132	1.560868	4.54	1.75	1.75	2.79	0
40	K3	R2	E	0.39	315	1.24	1.14	411	0.508857	0.631143	4.98	1.75	1.75	3.23	0
41	K4	L1	F	0.07	332	3.26	2.76	267	0.056295	2.703705	4.48	2.55	2.55	1.93	0
42	K4	L2	F	0.03	304	3.74	2.84	267	0.026349	2.813651	4.64	2.55	2.55	2.09	0
43	K4	R1	E	0.04	250	2.6	2.09	283	0.04528	2.04472	5.63	2.55	2.55	3.08	0
44	K4	R2	E	0.22	575	1.68	1.47	297	0.113635	1.356365	4.91	2.55	2.55	2.36	0
45	K5	L1	E	0.08	250	1.56	1.22	284	0.09088	1.12912	6.31	2.55	2.55	3.76	0
46	K5	R2	F	0.31	415	5.14	4.68	255	0.190482	4.489518	5.1	2.55	2.55	2.55	0
47	K5	L1	E	0.2	330	4.61	3.6	240	0.145455	3.454545	6.34	2.59	2.59	3.75	0
48	K5	L2	E	0.04	290	0.95	0.81	200	0.027586	0.782414	5.63	3.21	2.59	3.04	0.62
49	K5	L1	E	0.19	550	1.52	1.44	210	0.072545	1.367455	4.91	2.79	2.59	2.32	0.2
50	K5	L2	E	0.15	215	1.7	1.55	280	0.195349	1.354651	4.85	2.76	2.59	2.26	0.17
51	K5	R1	F	0.18	255	2.94	2.72	285	0.201176	2.518824	5.51	2.61	2.59	2.92	0.02
52	K5	R2	F	0.28	285	2.99	2.9	185	0.181754	2.718246	5.5	2.59	2.59	2.91	0

Nb of turf	Perc of #	M nb peck	M feed T	M peck T	M proc T	Head u	Mpeckrat1	Mpeckrat2	F nb peck	F feed T	F peck T	F proc T	F head up	Fpeckrat1	Fpeckrat2
17	0	0	0	0	0	0	ERR	ERR	54	27	19	5	2	2	2.842105
18	0						ERR	ERR	58	28	23	2	4	2.071429	2.521739
19	0						ERR	ERR	53	52	28	11	8	1.019231	1.892857
20	0						ERR	ERR	55	39	29	6	9	1.410256	1.896552
21	0	58	57	38	9	7	1.017544	1.526316						ERR	ERR
22	0	50	58	30	9	16	0.862069	1.666667	41	21	17	1	2	1.952381	2.411765
23	0	53	75	36	12	20	0.706667	1.472222	49	23	20	2	3	2.130435	2.45
24	0	51	48	29	11	10	1.0625	1.758621	27	15	11	1	3	1.8	2.454545
25	0	51	60	33	12	11	0.85	1.545455	48	33	25	5	8	1.454545	1.92
26	0	52	48	30	10	10	1.083333	1.733333	13	9	7	1	2	1.444444	1.857143
27	0	46	33	21	5	8	1.393939	2.190476	47	74	35	19	17	0.635135	1.342857
28	0	27	46	19	2	15	0.586957	1.421053	47	34	24	5	10	1.382353	1.958333
29	0	72	80	44	19	23	0.9	1.636364	43	41	21	9	12	1.04878	2.047619
30	0	52	79	41	14	27	0.658228	1.268293						ERR	ERR
31	0	75	72	41	11	10	1.041667	1.829268	16	16	8	3	5	1	2
32	0	51	47	33	6	6	1.085106	1.545455						ERR	ERR
33	0	52	78	38	10	9	0.666667	1.368421	15	15	8	4	3	1	1.875
34	0						ERR	ERR	56	54	27	6	9	1.037037	2.074074
35	0						ERR	ERR	53	45	25	10	9	1.177778	2.12
36	0	50	55	33	6	15	0.909091	1.515152	12	20	5	2	7	0.6	2.4
37	0						ERR	ERR	59	38	33	4	4	1.552632	1.787879
38	0	48	41	31	7	9	1.170732	1.548387	42	32	21	4	6	1.3125	2
39	0						ERR	ERR	59	57	31	7	9	1.035088	1.903226
40	0	48	75	34	10	12	0.64	1.411765	14	16	7	2	5	0.875	2
41	0	46	40	26	9	9	1.15	1.769231	57	34	23	4	8	1.676471	2.478261
42	0	29	31	20	5	5	0.935484	1.45	57	28	27	0	2	2.035714	2.111111
43	0	17	35	11	2	5	0.485714	1.545455	60	31	29	1	2	1.935484	2.068966
44	0						ERR	ERR	55	41	31	3	8	1.341463	1.774194
45	0						ERR	ERR	52	36	29	2	6	1.444444	1.793103
46	0	28	38	19	7	8	0.736842	1.473684	52	35	31	2	3	1.485714	1.677419
47	0	36	40	22	3	9	0.9	1.636364	55	35	29	4	5	1.571429	1.896552
48	16.93989						ERR	ERR	50	37	23	3	6	1.351351	2.173913
49	7.936508	17	29	13	4	5	0.586207	1.307692	52	34	27	3	6	1.529412	1.925926
50	6.995885						ERR	ERR	51	33	28	0	4	1.545455	1.821429
51	0.680272	9	10	8	0	2	0.9	1.125	54	30	29	0	1	1.8	1.862069
52	0						ERR	ERR	54	27	25	1	2	2	2.16

Nb of turf	Total peck	Bite size	Intake rate	Biomass	
17	54	0.053848	0.508444	12.15947	
18	58	0.024267	0.203306	9.401993	
19	53	0.025016	0.157316	12.72425	
20	55	0.034189	0.21542	10.69767	
21	58	0.030229	0.153285	8.106312	
22	91	0.025487	0.163943	7.275748	
23	102	0.02752	0.166532	11.62791	
24	78	0.028819	0.186704	8.770764	
25	99	0.032155	0.182341	7.873754	
26	65	0.019255	0.112381	7.707641	
27	93	0.036542	0.201615	9.335548	3 fighting
28	74	0.023576	0.134795	8.106312	
29	115	0.028616	0.168201	9.734219	
30	52	0.037794	0.159247	9.734219	4
31	91	0.020014	0.123484	7.375415	2
32	51	0.016574	0.085098	9.302326	
33	67	0.019933	0.096457	5.415282	4
34	56	0.016998	0.117124	7.641196	
35	53	0.033459	0.235659	10.69767	
36	62	0.038961	0.211188	8.538206	5
37	59	0.044832	0.266292	10.46512	
38	90	0.044347	0.255	11.52824	
39	59	0.026455	0.167278	9.269103	
40	62	0.01018	0.051142	10.7309	
41	103	0.02625	0.183314	6.41196	
42	86	0.032717	0.198887	6.943522	
43	77	0.026555	0.169827	10.23256	
44	55	0.024661	0.145361	7.840532	
45	52	0.021714	0.129353	12.49169	
46	80	0.056119	0.298307	8.471761	1
47	91	0.037962	0.225037	12.45847	
48	50	0.015648	0.113017	10.09967	
49	69	0.019818	0.113576	7.707641	
50	51	0.026562	0.160732	7.508306	
51	63	0.039981	0.226167	9.700997	
52	54	0.050338	0.361229	9.667774	

Nb of turf	nb block	site	E/F	W evap	T evap	Int,eva	In,ev,lo	evap-fee	otal evap	Intake g	Dry W G1	Dry W #1	W bags	Dry WG2	Dry W#2
53	K6	L1	F	0.06	310	1.86	1.69	225	0.043548	1.646452	6.66	2.59	2.59	4.07	0
54	K6	L2	F	0.05	425	1.91	1.86	210	0.024706	1.835294	8.21	2.59	2.59	5.62	0
55	K6	R1	E	0.03	355	1.09	1.08	255	0.021549	1.058451	6.47	2.92	2.59	3.88	0.33
56	K6	R2	E	0.13	410	1.61	1.53	283	0.089732	1.440268	6.21	2.59	2.59	3.62	0
57	K6	L1	F	0.12	315	3.08	2.75	220	0.08381	2.66619	5.94	2.59	2.59	3.35	0
58	K6	L2	F	0.15	360	3.14	3	215	0.089583	2.910417	6.27	2.59	2.59	3.68	0
59	K6	R1	E	0.1	434	1.21	1.15	210	0.048387	1.101613	5.93	2.87	2.59	3.34	0.28
60	K6	R2	E	0.19	430	1.55	1.39	245	0.108256	1.281744	5.88	2.59	2.59	3.29	0
61	K6	L1	F	0.14	500	3.03	2.65	230	0.0644	2.5856	5.9	2.77	2.59	3.31	0.18
62	K6	L2	F	0.07	390	3.3	2.99	200	0.035897	2.954103	5.75	2.59	2.59	3.16	0
63	K6	R1	E	0.2	335	2.58	1.94	235	0.140299	1.799701	5.96	2.59	2.59	3.37	0
64	K6	R2	E	0.02	360	1.74	1.58	210	0.011667	1.568333	5.49	3.05	2.59	2.9	0.46
65	K6	L1	F	0.08	335	2.17	1.93	210	0.050149	1.879851	5.31	2.67	2.59	2.72	0.08
66	K6	L2	F	0.12	400	3.25	3.06	210	0.063	2.997	5.93	2.59	2.59	3.34	0
67	K6	R1	E	0.09	285	2.17	1.93	365	0.115263	1.814737	5.26	2.89	2.59	2.67	0.3
68	K6	R2	E	0.14	465	1.75	1.5	215	0.064731	1.435269	6.38	2.59	2.59	3.79	0
69	K7	L1	E	0.09	300	2.02	1.35	255	0.0765	1.2735	6.86	2.59	2.59	4.27	0
70	K7	L2	E	0.14	330	1.5	1.17	220	0.093333	1.076667	5.78	2.9	2.59	3.19	0.31
71	K7	R1	F	0.2	345	4.28	3.81	205	0.118841	3.691159	6.26	2.84	2.59	3.67	0.25
72	K7	R2	F	0.12	360	4.02	3.75	165	0.055	3.695	6.5	2.59	2.59	3.91	0
73	K7	L1	E	0.1	325	1.95	1.66	230	0.070769	1.589231	5.17	2.67	2.59	2.58	0.08
74	K7	L2	E	0.17	380	1.37	1.31	230	0.102895	1.207105	5.43	2.9	2.59	2.84	0.31
75	K7	R1	F	0.14	390	2.55	2.31	270	0.096923	2.213077	5.8	2.99	2.59	3.21	0.4
76	K7	R2	F	0.25	395	3.55	3.12	175	0.110759	3.009241	5.88	2.59	2.59	3.29	0
77	K8	L1	F	0.02	315	2.77	2.73	310	0.019683	2.710317	6.77	2.57	2.57	4.2	0
78	K8	L2	F	0.12	330	2.94	2.84	245	0.089091	2.750909	6.34	2.57	2.57	3.77	0
79	K8	R1	E						ERR	ERR				0	0
80	K8	R2	E	0.05	355	1.98	1.88	175	0.024648	1.855352	5.75	2.94	2.57	3.18	0.37
81	K8	L1	F	0.01	265	1.49	1.41	395	0.014906	1.395094	5.61	2.9	2.57	3.04	0.33
82	K8	L2	F	0.02	230	3.04	2.81	225	0.019565	2.790435	5.82	2.57	2.57	3.25	0
83	K8	R1	E	0.07	385	2.42	2.28	300	0.054545	2.225455	4.94	3.27	2.57	2.37	0.7
84	K8	R2	E	0.01	405	2.24	2.17	230	0.005679	2.164321	5.27	3.23	2.57	2.7	0.66
85	K8	L1	F	0.08	300	2.39	2.1	240	0.064	2.036	5.57	2.57	2.57	3	0
86	K8	L2	F	0.1	465	0.84	0.8	265	0.056989	0.743011	4.91	2.57	2.57	2.34	0
87	K8	R1	E	0.08	410	2.36	2.12	280	0.054634	2.065366	4.69	3.01	2.57	2.12	0.44
88	K8	R2	E	0.07	290	1.93	1.84	405	0.097759	1.742241	4.31	2.78	2.57	1.74	0.21
89	K9	L1	E	0.06	300	4.77	4.63	310	0.062	4.568	4.01	5.04	2.57	1.44	2.47
90	K9	L2	E	0.06	300	2.7	2.61	240	0.048	2.562	5.69	3.4	2.57	3.12	0.83

Nb of turf	Perc of #	M nb peck	M feed T	M peck T	M proc T	Head u	Mpeckrat1	Mpeckrat2	F nb peck	F feed T	F peck T	F proc T	F head up	Fpeckrat1	Fpeckrat2
53	0	15	42	12	0	6	0.357143	1.25	56	37	32	3	8	1.513514	1.75
54	0	9	26	5	1	4	0.346154	1.8	53	29	23	3	5	1.827586	2.304348
55	7.83848	16	40	11	2	7	0.4	1.454545	58	35	28	3	7	1.657143	2.071429
56	0						ERR	ERR	57	40	30	8	5	1.425	1.9
57	0	39	42	25	6	13	0.928571	1.56	52	29	25	3	5	1.793103	2.08
58	0	24	27	16	1	6	0.888889	1.5	59	33	29	2	4	1.787879	2.034483
59	7.734807						ERR	ERR	51	34	27	5	7	1.5	1.888889
60	0						ERR	ERR	49	69	42	15	8	0.710145	1.166667
61	5.157593	45	49	27	2	11	0.918367	1.666667	60	37	30	3	7	1.621622	2
62	0	36	32	23	5	6	1.125	1.565217	59	30	29	0	2	1.966667	2.034483
63	0	27	60	18	4	11	0.45	1.5	44	45	24	5	8	0.977778	1.833333
64	13.69048	25	27	17	1	4	0.925926	1.470588	58	32	29	2	3	1.8125	2
65	2.857143	32	41	25	2	6	0.780488	1.28	60	33	29	0	3	1.818182	2.068966
66	0	24	31	22	3	5	0.774194	1.090909	58	31	29	1	3	1.870968	2
67	10.10101	19	37	13	2	8	0.513514	1.461538	61	39	36	1	3	1.564103	1.694444
68	0	20	36	13	2	8	0.555556	1.538462	54	35	29	3	4	1.542857	1.862069
69	0						ERR	ERR	50	63	35	4	13	0.793651	1.428571
70	8.857143	19	38	14	2	13	0.5	1.357143	54	33	28	2	4	1.636364	1.928571
71	6.377551	22	28	18	3	6	0.785714	1.222222	59	33	31	2	1	1.787879	1.903226
72	0	22	34	16	9	8	0.647059	1.375	53	31	28	2	6	1.709677	1.892857
73	3.007519	16	51	9	2	7	0.313725	1.777778	60	56	30	3	12	1.071429	2
74	9.84127	21	61	16	1	13	0.344262	1.3125	62	57	38	3	7	1.087719	1.631579
75	11.08033	24	34	17	2	5	0.705882	1.411765	60	37	31	4	5	1.621622	1.935484
76	0	24	35	20	3	9	0.685714	1.2	53	27	25	2	3	1.962963	2.12
77	0						ERR	ERR	55	33	27	4	4	1.666667	2.037037
78	0						ERR	ERR	52	30	23	3	5	1.733333	2.26087
79	ERR						ERR	ERR						ERR	ERR
80	10.42254	22	54	18	2	11	0.407407	1.222222	54	47	33	3	10	1.148936	1.636364
81	9.792285	32	42	20	3	7	0.761905	1.6	50	28	23	1	5	1.785714	2.173913
82	0	43	38	25	4	8	1.131579	1.72	54	30	25	1	6	1.8	2.16
83	22.8013	27	110	22	1	13	0.245455	1.227273	59	98	37	2	12	0.602041	1.594595
84	19.64286						ERR	ERR	51	39	34	1	5	1.307692	1.5
85	0	54	60	30	4	14	0.9	1.8	42	42	23	3	11	1	1.826087
86	0	52	41	28	2	7	1.268293	1.857143						ERR	ERR
87	17.1875	46	73	34	8	16	0.630137	1.352941	46	40	27	3	10	1.15	1.703704
88	10.76923						ERR	ERR	53	38	33	0	4	1.394737	1.606061
89	63.17136	44	71	32	3	14	0.619718	1.375	57	48	33	2	12	1.1875	1.727273
90	21.01266						ERR	ERR	56	56	33	8	13	1	1.69697

Nb of turf	Total peck	Bite size	Intake rate	Biomass	
53	71	0.023189	0.124317	13.52159	
54	62	0.029602	0.217762	18.6711	
55	74	0.014303	0.090165	12.89037	
56	57	0.025268	0.159498	12.02658	
57	91	0.029299	0.177156	11.12957	
58	83	0.035065	0.21487	12.22591	
59	51	0.0216	0.13555	11.09635	
60	49	0.026158	0.101388	10.93023	
61	105	0.024625	0.150702	10.99668	
62	95	0.031096	0.188736	10.49834	
63	71	0.025348	0.142359	11.19601	
64	83	0.018896	0.11327	9.634551	
65	92	0.020433	0.115655	9.036545	
66	82	0.036549	0.195232	11.09635	
67	80	0.022684	0.123041	8.870432	
68	74	0.019396	0.113532	12.59136	
69	50	0.02547	0.120883	14.18605	
70	73	0.014749	0.085166	10.59801	
71	81	0.04557	0.250265	12.19269	
72	75	0.049267	0.278994	12.99003	
73	76	0.020911	0.13538	8.571429	
74	83	0.014543	0.074265	9.435216	
75	84	0.026346	0.153175	10.66445	
76	77	0.039081	0.222166	10.93023	
77	55	0.049278	0.333495	13.95349	
78	52	0.052902	0.397358	12.52492	
79	0	ERR	ERR	0	missing
80	76	0.024413	0.120862	10.56478	
81	82	0.017013	0.107788	10.09967	
82	97	0.028767	0.185411	10.79734	
83	86	0.025877	0.125314	7.873754	
84	51	0.042438	0.211483	8.9701	
85	96	0.021208	0.127625	9.966777	
86	52	0.014289	0.08816	7.774086	
87	92	0.02245	0.112487	7.043189	
88	53	0.032872	0.175399	5.780731	
89	101	0.045228	0.233478	4.784053	
90	56	0.04575	0.257928	10.36545	

Nb of turf	nb block	site	E/F	W evap	T evap	Int,eva	In,ev,lo	evap-fee	otal evap	Intake g	Dry W G1	Dry W #1	W bags	Dry WG2	Dry W#2
91	K9	R1	F	0.1	230	6.1	5.89	220	0.095652	5.794348	5.08	4.44	2.57	2.51	1.87
92	K9	R2	F	0.09	280	4.39	4.16	210	0.0675	4.0925	6.46	3.35	2.57	3.89	0.78
93	K9	L1	E	0.09	340	2.75	2.51	220	0.058235	2.451765	4.27	3.46	2.57	1.7	0.89
94	K9	L2	E	0.06	300	2.18	1.87	175	0.035	1.835	5.55	3.32	2.57	2.98	0.75
95	K9	R1	F	0	360	1.5	1.5	195	0	1.5	3.62	4.75	2.57	1.05	2.18
96	K9	R2	F	0.07	220	2.13	2.08	185	0.058864	2.021136	4.06	4.45	2.57	1.49	1.88
97	K9	L1	E	0.01	260	0.99	0.93	235	0.009038	0.920962	3.16	4.24	2.57	0.59	1.67
98	K9	L2	E	0.15	345	0.93	0.93	340	0.147826	0.782174	3.36	3.51	2.57	0.79	0.94
99	K9	R1	F	0.15	380	1.76	1.51	275	0.108553	1.401447	4.4	2.73	2.57	1.83	0.16
100	K9	R2	F	0.13	430	3.36	3.07	250	0.075581	2.994419	4.87	3.37	2.57	2.3	0.8
101	K10	L1	F	0.06	345	4.28	3.62	190	0.033043	3.586957	7.01	2.73	2.57	4.44	0.16
102	K10	L2	F	0.04	390	4.34	3.88	225	0.023077	3.856923	4.64	3.83	2.57	2.07	1.26
103	K10	R1	E	0.06	300	1.94	1.8	250	0.05	1.75	5.01	3.9	2.57	2.44	1.33
104	K10	R2	E	0.05	290	2.05	2.05	350	0.060345	1.989655	5.71	3.26	2.57	3.14	0.69
105	K10	L1	F	0.07	325	2.85	2.68	205	0.044154	2.635846	5.52	2.96	2.57	2.95	0.39
106	K10	L2	F	0.07	260	1.59	1.59	215	0.057885	1.532115	4.2	2.94	2.57	1.63	0.37
107	K10	R1	E	0.06	380	1.41	1.41	300	0.047368	1.362632	4.94	3.2	2.57	2.37	0.63
108	K10	R2	E	0.06	320	2.92	2.72	495	0.092813	2.627188	5.04	3.18	2.57	2.47	0.61
109	K10	L1	F	0.04	300	5.37	4.87	1680	0.224	4.646	4.3	3.82	2.57	1.73	1.25
110	K10	L2	F	0.06	320	1.52	1.52	220	0.04125	1.47875	3.46	2.99	2.57	0.89	0.42
111	K10	R1	E	0.08	295	1.81	1.73	240	0.065085	1.664915	4.42	3.23	2.57	1.85	0.66
112	K10	R2	E	0.08	270	1.61	1.61	240	0.071111	1.538889	5.14	3.13	2.57	2.57	0.56
113	K11	L1	E	0.04	315	3.47	3.33	235	0.029841	3.300159	5.41	3.95	2.57	2.84	1.38
114	K11	L2	E	0	255	2.72	2.56	240	0	2.56	4.3	3.99	2.57	1.73	1.42
115	K11	R1	F	0.07	265	5.92	5.33	210	0.055472	5.274528	4.56	4.7	2.57	1.99	2.13
116	K11	R2	F	0.1	260	2.83	2.73	225	0.086538	2.643462	3.63	2.93	2.57	1.06	0.36
117	K11	L1	E	0.21	310	1.01	0.88	325	0.220161	0.659839	4.84	3.7	2.57	2.27	1.13
118	K11	L2	F	0.13	340	2.4	2.2	435	0.166324	2.033676	4.3	3.58	2.57	1.73	1.01
119	K11	R1	F	0.11	240	4.59	4.3	240	0.11	4.19	4.43	4.61	2.57	1.86	2.04
120	K11	R2	F	0.09	300	4.9	4.72	225	0.0675	4.6525	3.4	4.05	2.57	0.83	1.48
121	K11	L1	E	0.1	310	1.76	1.68	280	0.090323	1.589677	6.64	3.19	2.57	4.07	0.62
122	K11	L2	E	0.12	390	3.16	3.09	420	0.129231	2.960769	4.21	3.28	2.57	1.64	0.71
123	K11	R1	F	0.12	350	1.33	1.23	205	0.070286	1.159714	3.82	2.57	2.57	1.25	0
124	K11	R2	F	0.3	360	3.81	3.52	240	0.2	3.32	3.26	2.57	2.57	0.69	0
125	K12	L1	F	0.09	360	2.65	2.36	240	0.06	2.3	5.48	5.89	2.57	2.91	3.32
126	K12	L2	F	0.2	210	5.51	5.08	225	0.214286	4.865714	5.27	5.12	2.57	2.7	2.55

Nb of turf	Perc of #	M nb peck	M feed T	M peck T	M proc T	Head u	Mpeckrat1	Mpeckrat2	F nb peck	F feed T	F peck T	F proc T	F head up	Fpeckrat1	Fpeckrat2
91	42.69406	48	44	27	9	12	1.090909	1.777778	52	35	25	4	8	1.485714	2.08
92	16.70236	18	41	20	6	8	0.439024	0.9	64	42	34	5	7	1.52381	1.882353
93	34.36293						ERR	ERR	65	48	40	1	4	1.354167	1.625
94	20.10724						ERR	ERR	51	33	28	1	3	1.545455	1.821429
95	67.49226						ERR	ERR	56	50	38	5	4	1.12	1.473684
96	55.78635						ERR	ERR	58	45	30	7	7	1.288889	1.933333
97	73.89381						ERR	ERR	58	139	39	10	12	0.417266	1.487179
98	54.33526						ERR	ERR	20	18	14	0	4	1.111111	1.428571
99	8.040201	57	71	31	4	15	0.802817	1.83871	36	30	19	3	5	1.2	1.894737
100	25.80645	56	70	36	6	27	0.8	1.555556	30	48	17	8	18	0.625	1.764706
101	3.478261	28	31	18	6	13	0.903226	1.555556	58	27	25	0	2	2.148148	2.32
102	37.83784	50	62	30	10	18	0.806452	1.666667	51	56	21	4	15	0.910714	2.428571
103	35.27851	34	84	23	8	20	0.404762	1.478261	50	66	28	6	10	0.757576	1.785714
104	18.01567	54	58	34	8	15	0.931034	1.588235						ERR	ERR
105	11.67665	26	34	19	5	12	0.764706	1.368421	53	26	24	0	2	2.038462	2.208333
106	18.5	14	44	10	2	7	0.318182	1.4	59	38	30	5	7	1.552632	1.966667
107	21	59	150	54	13	24	0.393333	1.092593						ERR	ERR
108	19.80519	32	53	40	3	15	0.603774	0.8	52	37	26	2	6	1.405405	2
109	41.94631	39	42	24	8	9	0.928571	1.625	54	36	27	5	6	1.5	2
110	32.06107	8	27	8	0	4	0.296296	1	52	38	28	5	8	1.368421	1.857143
111	26.29482	33	79	18	5	14	0.417722	1.833333	53	52	29	8	10	1.019231	1.827586
112	17.89137	10	146	5	0	8	0.068493	2	55	73	26	7	13	0.753425	2.115385
113	32.70142	35	45	24	5	10	0.777778	1.458333	58	36	27	6	8	1.611111	2.148148
114	45.07937	53	65	33	7	15	0.815385	1.606061	38	34	21	5	6	1.117647	1.809524
115	51.69903	49	49	29	9	14	1	1.689655	48	36	26	8	9	1.333333	1.846154
116	25.35211	14	41	7	0	5	0.341463	2	56	43	30	3	8	1.302326	1.866667
117	33.23529	27	76	18	2	13	0.355263	1.5	25	34	12	1	8	0.735294	2.083333
118	36.86131	55	143	35	7	21	0.384615	1.571429	27	63	15	4	14	0.428571	1.8
119	52.30769	55	64	37	8	15	0.859375	1.486486	20	25	9	3	7	0.8	2.222222
120	64.06926	35	70	26	5	9	0.5	1.346154	53	55	37	6	10	0.963636	1.432432
121	13.21962	15	105	9	1	7	0.142857	1.666667	54	44	27	3	7	1.227273	2
122	30.21277	50	183	39	4	20	0.273224	1.282051	51	186	34	2	17	0.274194	1.5
123	0	37	39	21	1	7	0.948718	1.761905	55	33	30	0	4	1.666667	1.833333
124	0	48	89	38	2	10	0.539326	1.263158	45	46	25	3	9	0.978261	1.8
125	53.29053	32	47	18	3	14	0.680851	1.777778	60	45	35	6	9	1.333333	1.714286
126	48.57143	41	44	26	5	7	0.931818	1.576923	51	39	25	6	8	1.307692	2.04

Nb of turf	Total peck	Bite size	Intake rate	Biomass	
91	100	0.057943	0.370199	8.33887	
92	82	0.049909	0.251784	12.92359	1
93	65	0.037719	0.203635	5.647841	
94	51	0.03598	0.217727	9.900332	
95	56	0.026786	0.131142	3.488372	
96	58	0.034847	0.223825	4.950166	
97	58	0.015879	0.078453	1.960133	
98	20	0.039109	0.185613	2.624585	
99	93	0.015069	0.093119	6.079734	09/10
100	86	0.034819	0.187703	7.641196	6
101	86	0.041709	0.277135	14.75083	
102	101	0.038187	0.251249	6.877076	
103	84	0.020833	0.113999	8.106312	
104	54	0.036845	0.194416	10.43189	
105	79	0.033365	0.20365	9.800664	
106	73	0.020988	0.127252	5.415282	
107	59	0.023095	0.083834	7.873754	
108	84	0.031276	0.132245	8.20598	
109	93	0.049957	0.302651	5.747508	
110	60	0.024646	0.136466	2.956811	
111	86	0.019359	0.117687	6.146179	
112	65	0.023675	0.164922	8.538206	5
113	93	0.035486	0.21498	9.435216	
114	91	0.028132	0.1575	5.747508	
115	97	0.054377	0.318606	6.611296	
116	70	0.037764	0.237358	3.521595	
117	52	0.012689	0.073072	7.541528	
118	82	0.024801	0.135128	5.747508	
119	75	0.055867	0.302614	6.179402	
120	88	0.052869	0.245346	2.757475	
121	69	0.023039	0.146703	13.52159	
122	101	0.029315	0.134746	5.448505	
123	92	0.012606	0.075546	4.152824	
124	93	0.035699	0.175078	2.292359	2
125	92	0.025	0.144174	9.667774	
126	92	0.052888	0.316964	8.9701	

Nb of turf	nb block	site	E/F	W evap	T evap	Int,eva	In,ev,lo	evap-fee	otal evap	Intake g	Dry W G1	Dry W #1	W bags	Dry WG2	Dry W#2
127	K12	R1	E	0.04	280	3.28	3.02	215	0.030714	2.989286	4.85	3.81	2.57	2.28	1.24
128	K12	R2	E	0.09	320	2.89	2.59	260	0.073125	2.516875	5.51	3.57	2.57	2.94	1
129	K12	L1	F						ERR	ERR				0	0
130	K12	L2	F						ERR	ERR				0	0
131	K12	R1	E						ERR	ERR				0	0
132	K12	R2	E						ERR	ERR				0	0
133	K13	L1	E	0.02	320	1.39	1.34	320	0.02	1.32	5.39	4.18	2.57	2.82	1.61
134	K13	L2	E	0.08	440	3.7	3.5	250	0.045455	3.454545	5.42	5.09	2.57	2.85	2.52
135	K13	R1	F	0.06	310	3.22	2.95	240	0.046452	2.903548	5.34	3.55	2.57	2.77	0.98
136	K13	R2	F	0.06	315	3.56	3.28	360	0.068571	3.211429	4.25	3.4	2.57	1.68	0.83
137	K13	L1	E	0.13	450	1.73	1.64	370	0.106889	1.533111	5.03	3.41	2.57	2.46	0.84
138	K13	L2	E						ERR	ERR				0	0
139	K13	R1	F	0.03	210	2.12	2.01	360	0.051429	1.958571	5.04	3.79	2.57	2.47	1.22
140	K13	R2	F	0.09	270	3.2	2.99	240	0.08	2.91	4.25	3	2.57	1.68	0.43
141	K13	L1	E	0.06	240	1.32	1.25	220	0.055	1.195	4.35	2.95	2.57	1.78	0.38
142	K13	L2	E	0.04	230	2.65	2.65	1300	0.226087	2.423913	4.02	3.01	2.57	1.45	0.44
143	K13	R1	F	0.11	315	510	1.54	1.54	0.000538	1.539462	4.34	2.81	2.57	1.77	0.24
144	K13	R2	F	0.17	600	900	1.61	1.61	0.000456	1.609544	3.7	3.08	2.57	1.13	0.51
145	K13	L1	E	0.09	280	320	1.04	1.04	0.000334	1.039666	3.59	2.79	2.57	1.02	0.22
146	K13	L2	E						ERR	ERR				0	0
147	K13	R1	F	0.04	180	280	1.29	1.22	0.000271	1.289729	3.16	2.87	2.57	0.59	0.3
148	K13	R2	F	0.08	370	280	1.77	1.77	0.000383	1.769617	3.12	2.68	2.57	0.55	0.11

Nb of turf	Perc of #	M nb peck	M feed T	M peck T	M proc T	Head u	Mpeckrat1	Mpeckrat2	F nb peck	F feed T	F peck T	F proc T	F head up	Fpeckrat1	Fpeckrat2
127	35.22727	27	41	18	3	8	0.658537	1.5	58	47	34	6	12	1.234043	1.705882
128	25.38071	30	87	19	2	11	0.344828	1.578947	55	40	30	5	9	1.375	1.833333
129	ERR						ERR	ERR						ERR	ERR
130	ERR						ERR	ERR						ERR	ERR
131	ERR						ERR	ERR						ERR	ERR
132	ERR						ERR	ERR						ERR	ERR
133	36.34312						ERR	ERR	56	67	47	8	11	0.835821	1.191489
134	46.92737	11	18	7	0	5	0.611111	1.571429	55	38	31	4	5	1.447368	1.774194
135	26.13333	37	45	22	2	5	0.822222	1.681818	59	42	28	5	9	1.404762	2.107143
136	33.06773	51	70	29	3	10	0.728571	1.758621	54	63	25	6	9	0.857143	2.16
137	25.45455	21	70	13	0	6	0.3	1.615385	53	40	29	9	8	1.325	1.827586
138	ERR						ERR	ERR						ERR	ERR
139	33.06233	45	68	32	2	15	0.661765	1.40625	53	35	26	4	7	1.514286	2.038462
140	20.37915	52	52	32	0	14	1	1.625	38	21	16	0	9	1.809524	2.375
141	17.59259						ERR	ERR	57	45	35	5	5	1.266667	1.628571
142	23.28042	52	80	34	0	11	0.65	1.529412	60	51	33	0	9	1.176471	1.818182
143	11.9403	31	29	20	3	8	1.068966	1.55	60	32	29	0	3	1.875	2.068966
144	31.09756						ERR	ERR	55	42	28	8	9	1.309524	1.964286
145	17.74194						ERR	ERR	28	45	17	2	6	0.622222	1.647059
146	ERR						ERR	ERR						ERR	ERR
147	33.70787						ERR	ERR	56	42	32	3	7	1.333333	1.75
148	16.66667	16	124	23	16	14	0.129032	0.695652	38	120	19	5	17	0.316667	2

Nb of turf	Total peck	Bite size	ERR	Biomass	
127	85	0.035168	0.190984	7.574751	
128	85	0.02961	0.170647	9.767442	
129	0	ERR	ERR	0	missing
130	0	ERR	ERR	0	missing
131	0	ERR	ERR	0	missing
132	0	ERR	ERR	0	missing
133	56	0.023571	0.093306	9.368771	
134	66	0.052342	0.302024	9.468439	
135	96	0.030245	0.192927	9.202658	
136	105	0.030585	0.197578	5.581395	
137	74	0.020718	0.121271	8.172757	
138	0	ERR	ERR	0	on utilisab
139	98	0.019985	0.112188	8.20598	
140	90	0.032333	0.201412	5.581395	
141	57	0.020965	0.113431	5.913621	2
142	112	0.021642	0.120192	4.817276	
143	91	0.016917	0.104377	5.880399	
144	55	0.029264	0.190976	3.754153	
145	28	0.037131	0.203179	3.388704	
146	0	ERR	ERR	0	on utilisab
147	56	0.023031	0.1339	1.960133	
148	54	0.032771	0.139979	1.827243	