EXAMINATION QUESTIONS

Faculty:	**BIOSCIENCES**	
Examination in:	**PJH212** *Course code*	**Cropping systems of grain crops and grasslands** *Course name*
Time for exams:	Tuesday 26. May *Day and date*	9.00–12.00 (3 h) *As from – to and duration of examinations (hours)*
Course responsible:	Anne Kjersti Uhlen *Name*	

Permissible aids: C3; all types of calculators, all other aids - including digital.

The exams papers includes: 3 *Number of pages incl. attachment*

The examination consists of three parts (questions) that counts equally.

Question 1

A farmer has three different arable fields:
Field 1: Clay (45 % clay, 30 % silt and 25 sand) which is properly drained
Field 2: Silty loam (23 % clay, 65 silt and 12 sand) which is poorly drained
Field 3: Sandy silt (8 % clay, 60 % silt and 32 sand) which is incompletely drained

None of the fields are exposed to erosion and it is generally no weed problem at the fields. However, the area is normally exposed to drought early in the growing season. The farmer will grow barley on all tree fields this year.

a) What will be your advices to the farmer for soil tillage systems on each of these three fields? Explain your answer.

b) Use your recommendations in question a) to advice the farmer how he/she should conduct seedbed preparations and especially point out what he/she should take into consideration to obtain proper conditions for seed corn germination.

Question 2

The context of question 2a–c is a cluster of four rather large dairy farms in Levanger in Central Norway (Trøndelag). They are located close to each other with partly adjoining borders. All of them have their own machinery for silage production (tractors, mowers, balers etc.)

In 2016, the first cut was taken in the afternoon on 10 June, and the baling was conducted in the evening on 11 June. There was no precipitation in between. The swards were rather similar in botanical composition, with 15–20 % red clover, and 60–70 % timothy. The rest was meadow fescue. The dry matter yields were also about the same at the four farms. The silages were analysed in October the same year, and some of the analytical results are presented in the table below.

Farmer	**Content of different components in silage from first cut**		
	Dry matter (%)	Lactic acid (g/kg dry matter)	Water soluble carbohydrates (g/kg dry matter)
Eivind	28	40	120
Asbjørn	34	35	140
Helga	28	100	50
Kjersti	34	80	80

a) On basis of the silage lab-results above, what would you suggest where the differences in types of mowers, techniques and principles for swathing and in application of silage additives between the four farmers?
b) Given that the differing composition of the silages is related to differences in types of mowers and/or swathing devices, what could be the farmers' motivation for buying and applying different types? What can be the background for different practice in application of silage additives?

After the first cut, Eivind and Asbjørn decided to apply 40 kg N/ha and to take the second cut rather late, on 12 August. Helga and Kjersti decided to apply 90 kg N/ha and to take the second cut earlier, on 25 July. Other nutrients, such as P, K and S were applied in surplus on all fields.

c) How would you expect that dry matter yield, botanical composition and digestibility of the yield varied between the two types of second cuts? Please, explain the background for you answer.

Question 3

a) Describe conditions during grain filling that can affect the content of starch and protein in mature grains of wheat.

b) A batch of spring wheat was analysed for quality traits at the grain delivery. The results showed Falling Number of 325, test weight of 81, and protein content of 11,9 %. The

batch was of a variety from class 2 int the Norwegian classification system, equivalent to strong gluten. Evaluate the quality of this batch for milling and usage for whole-meal breads. What do the quality analyses indicate about weather conditions during grain filling an maturation?

c) Discuss measures that the farmer in b) could have done to obtain optimal quality for whole-meal breads.

Course responsible: Anne Kjersti Uhlen

External examiner: Arve Skutlaberg