

## Article

# The Topic of the Ideal Dairy Farm Can Inspire How to Assess Knowledge about Dairy Production Processes: A Case Study with Students and Their Contributions

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**Abstract:** The dairy farm and on-farm production processes are the subject of numerous evaluations. These are not only evaluations of the economic efficiency of milk production. Opinions expressed by various social groups are also an important contribution to improving the approach to milk production on the farm. As a result of such opinions, a vision of an ideal dairy farm may be formed. The aim of the study was to develop the thematic area of an ideal dairy farm in the opinion of two groups of students who were learning remotely (in the distance learning system) due to the Covid-19 pandemic. The first group consisted of six Erasmus+ students. The second group consisted of 70 full-time Polish students. As part of their homework, the students answered three questions about the ideal dairy farm. Students had 4 weeks to do their homework. Erasmus+ students' homework was used to propose a ranking method for assessing the answers to three questions by the students themselves. Homework of Polish students was used to analyze the frequency of using certain keywords. Polish students, in their homework on the ideal dairy farm, mainly used the basic concepts related to dairy production. Unfortunately, a very small number of students used terms that represent a responsible approach to dairy production, including ethical aspects, freedom, sustainability, animal pain, antibiotics, and organic milk production. In conclusion, it was indicated that the curriculum should be structured in such a way as to raise students' awareness of dairy production and its current challenges.

**Keywords:** dairy; engineering; farm; homework; process; student; technology; welfare



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## 1. Introduction

Dairy farms and dairy production processes are the subject of many studies and assessments. These are assessments focusing on economic [1], technological [2], technical [3], energy [4], environmental [5], sociological [6] and other aspects which highlight the broad spectrum of research issues generated by a dairy farm. Detailed research conducted in the field of production processes on dairy farms is used to identify contemporary production problems, translating into a vision of dairy farms in the short and long perspective. The ideal dairy farm fits perfectly into the process of creating the vision of a dairy farm [7].

Each of us is a consumer, and therefore everyone is close to the area related to access to food. In view of the growing awareness of consumers, the thematic area of agriculture and food economy becomes a subject of permanent interest due to the need for access to high-quality food products. High-quality food products are the result of care for the production environment and improvement of individual links in the chain connecting farms and consumers on the market [8]. In this chain, the key role can be assigned to

the farm as a place to achieve specific production goals, which are subject to detailed assessment. So what should a farm be like in order to meet more and more sophisticated evaluation criteria? Using the example of dairy farms, it is possible to indicate the desire to formulate the concept of an ideal dairy farm [9].

Under the seemingly simple phrase “ideal dairy farm” there is a large body of assessment factors, considered individually, taking into account the leading issues of animal welfare [10–12], sustainable production [13], economic efficiency of production [14,15], ethical aspects [16], as well as the satisfaction of dairy farm owners with the conducted activity [17]. A separate issue is the approach to the assessment of the factors that constitute an ideal dairy farm, whether in the form of experiments, computational (economic) analyzes, or collecting opinions in the form of a survey. The latter approach to research raises the question of the respondents who comment on the ideal dairy farm. In a study by [18] they were farmers, agricultural advisors and lay citizens (people who self-identified as having no involvement in animal production). In other studies [9] they were people not affiliated with the dairy industry.

The problem of outlining the vision and future of dairy farms is also undertaken with students, taking into account the aspects shaping the essence of an ideal dairy farm, including taking care of dairy cattle [19]. A feature of the research conducted so far, where students assessed various aspects of dairy production, were large groups of research participants, including up to a thousand people [20]. In studies with a large number of participants, the use of the survey dominates, and its completion is relatively short.

The aim of the study was to develop the thematic area of an ideal dairy farm in the opinion of two groups of students who were learning remotely (in the distance learning system) due to the Covid-19 pandemic. The following research hypothesis was formulated: Students have different levels of knowledge about dairy production and use a limited range of concepts when presenting their vision of an ideal dairy farm.

## 2. Materials and Methods

### 2.1. Students Participating in Courses and Studies

Two groups of students were included in the research. The first group consisted of six Erasmus+ students. The second group consisted of 70 full-time students.

All Erasmus+ students participating in the study are also co-authors of this article. Five of the students were from France and one from Taiwan. The French students came from three agricultural colleges located in different regions of the country, i.e., Ile-de-France, Hauts-de-France and Occitanie. The student from Taiwan also studied agriculture and life sciences at a university in her country. All (six) students were invited to take part in the research study and all agreed to be included. The group of students consisted of only six people, because there were only so many participants in a given Erasmus+ course.

Students started Erasmus+ exchange studies at Warsaw University of Life Sciences in Poland at the end of February 2020. At the time of starting the exchange studies in Warsaw, the students had the following number of semesters at their home universities: seven semesters in bachelor studies (five students) and five semesters in bachelor studies (one student). All students participating in the course and study were under the age of 25. At their home universities, students followed a basic course in agriculture, taking into account aspects of plant and animal production.

The second group of students (70 people) studied at the bachelor studies at the Warsaw University of Life Sciences in the summer semester of the academic year 2020/2021. These studies were carried out in Polish. The group of students covered by the study included 40 men and 30 women.

In order to facilitate the identification of individual groups of students covered by the research, two terms are used in the article: Erasmus+ students and Polish students.

## 2.2. Organization of Joint Teaching Activities with Erasmus+ Students

In the first week of classes in the semester, students had general meetings related to getting to know the University they are studying. In the second week, auditorium classes (lecture) were held in the lecture hall. However, from the next week, i.e., from mid-March 2020, until the end of the semester, classes were conducted only remotely (distance learning), due to the dangers arising from the coronavirus epidemic. The summer semester of classes attended by the students lasted a total of 15 weeks. The students included in the study formed a group participating in the “Agricultural engineering management in field and animal production” course. Even before the beginning of the semester, this course was chosen by six students and such a number of students participated in the classes. Such a number of students participating in the “Agricultural engineering management in field and animal production” course was representative for this course, conducted for several years at the Warsaw University of Life Sciences. So far, generally five to seven students have participated in the course each semester. However, it was the first year when the course was conducted mainly in the remote version. Classes were held once a week for two lecture hours ( $2 \times 45$  min), i.e., 1.5 h. The remote version of the lecture was conducted with the use of the zoom program, which made it possible to present the lecture in PowerPoint.

## 2.3. Participation of Erasmus+ Students in the Course as a Stage of Preparation for a Research Study

The structure of the course “Agricultural engineering management in field and animal production” covered topics related to the implementation of technological processes and their management in field crop and livestock production. For the purpose of the research study, the presentation of topics related to animal production was of key importance during the course. The intention of this part of the course was to present by the lecturer a wide range of conditions for conducting dairy production on the farm, with particular emphasis on the technical equipment, its modernity and the impact on the comfort achieved by dairy cattle. An important element of the lectures for students was the presentation of the results of own research conducted by the lecturer in the area of dairy production. The lectures also included a review of the specifics of dairy production on an international scale.

## 2.4. Data for the Research Study as a Result of Erasmus+ Students' Homework

During the course, the lecturer gave a total of five homework assignments, four of which concerned the calculations of the use of machines in plant production. The fifth task, on the other hand, related to the area of dairy production. It was given by the lecturer three weeks before the end of the course, with the deadline for completion within four weeks (in the second half of June 2020). The fifth task was the most complex in its content, so the time to complete it was relatively long. The answers given by Erasmus+ students as part of this task became the data for the research study. In order to fulfill the condition of independence of the collected research results, the students prepared their answers individually, without mutual communication between themselves. The condition of individual, independent preparation of answers to the questions was imposed on the students at the stage of handing over the homework. When preparing answers to the homework questions, the students were aware that they would contribute to a joint research paper. Preparing a joint scientific publication based on homework assignments was seen as a motivating factor for students to take a responsible approach to answering questions asked in homework. Such a motivating factor can be taken as a proposed approach to the issue posed in literature [21]: How do you motivate students to do their homework?

The issues to be individually developed by students included the following three questions:

- (1) How do you understand the term: ideal dairy farm?
- (2) On the basis of what criteria—in your opinion—can the ideal dairy farm be considered?
- (3) In your opinion, the understanding of an ideal dairy farm may differ between farmers (dairy farm owners) and consumers? Justify the answer.

In addition to answering three questions, the students were given one more task. The following task was formulated for students: Prepare a review of the state of knowledge for the article on understanding the ideal dairy farm (a proposal for our joint scientific article). Please include citations in the text and references at the end of the study.

#### *2.5. Data for a Research Study as a Result of Polish Students' Homework*

Polish students participated in the course "Natural production technologies", which included a total of 30 h of lectures in the remote version. Five lectures concerned various aspects of dairy production conducted on farms. The lecturer asked Polish students to prepare homework. This homework assignment consisted of answering the same three questions as the questions asked to Erasmus+ students (Section 2.4), but in Polish. Polish students had four weeks to prepare their homework, as in the case of Erasmus+ students. The content of Polish students' homework was analyzed in order to determine the frequency of using certain keywords.

#### *2.6. A Methodical Approach to Developing the Results of a Research Study with Erasmus+ Students*

The methodical approach to research includes a qualitative procedure which, unlike quantitative research, refers to textual data and takes into account the use of one's own research strategy [22–24]. In terms of the paradigm of the qualitative research, the focus was on the participants' perceptions and experiences in the area of dairy production.

For the purposes of developing and analyzing the results of the research, students and their works were drawn at random, therefore the terms Student 1, Student 2, Student 3, Student 4, Student 5 and Student 6 are used in the further part of the work. Students do not know the results of the draw, so who has been assigned a specific number in the study. This information is known only to the lecturer, who is also a co-author of this article. Regardless, the students individually knew their answers and were able to identify them, but did not know who was behind the other answers. All answers, arranged in random order, were sent individually to the students by the lecturer. The lecturer suggested to each student to establish a ranking list of answers based on the proposed criteria. These criteria were the accuracy (depth) of the answers to the question asked and the structure of the answers, which made them clear (taking into account the division of the text into paragraphs, listing the most important issues). The preparation of the ranking list of answers related to each of the three research questions. The purpose of compiling the ranking list was to critically evaluate the answers by students. By the way, each student made a self-assessment and reflection on her own answer compared to that of other students. For each question and criterion (accuracy and structure of answers), after each student ranked the answers, the places of answers in the ranking were summed up. The answers with the lowest scores were at the top of the ranking, and the answers with the highest scores at the end of the ranking. In the overall assessment of each question, an equal share of the criterion of accuracy and structure of answers was taken into account. Ranking lists from all students were used for in-depth analysis by the ranking method. In order to compare students' responses based on the rankings, the H Kruskal-Wallis test was performed, which is a non-parametric alternative to the one-way ANOVA in parametric tests [25]. The Statistica v.13 software [26] was used for the analysis.

The proposed method of analyzing the research material resulted from the number of students participating in the course who prepared answers to the questions. Thanks to a relatively small number of students, it was possible to implement the idea of a ranking list of answers. Reliable compilation of the ranking of answers was possible only if the number of students and their homework with the answers was limited. Ranking the answers from a very large population of people would be significantly difficult due to the limitations in the perception of a large amount of material that requires assessment for the purposes of the ranking.

The comparison of students' answers was also made on the basis of descriptive statistics. A quantitative comparison of the answers given by students to three research

questions was made on the basis of the number of words and characters used. The qualitative assessment and comparison of students' answers was conducted in the form of a discussion, pointing to various aspects of the individual approach and reflections of students answering the questions.

### 2.7. A Methodical Approach to Developing the Results of a Research Study with Polish Students

Keywords generated on the basis of studies prepared by Polish students were used for the quantitative comparison. In total, 60 keywords were proposed, including 58 single words and two phrases consisting of two words. The frequency of using keywords in studies prepared by students was assessed. In the first stage, it was determined how many times particular keywords were used in individual student work. Then, the frequency of use of individual keywords from the texts of all students was summed up. In the last step, the average frequency of use of individual 60 keywords per one person was determined. The keywords were listed in order from the highest to the lowest frequency of their use in student studies.

When identifying keywords in the materials prepared by Polish students, the word search function in Word was used. Nouns were entered into the search engine in the singular; if the search engine showed a given noun in both singular and plural, the total number of words in both forms was taken into account. Words with the same semantic basis were also counted together, e.g., sustainable/sustainability, intensive/intensification, safe/safety, graze/grazing. Among the keywords considered, those included in the term "ideal dairy farm" were not taken into account. The keywords "farmer" and "consumer" were not taken into account in the analysis of the keywords, as they were included in the content of the third question asked to Polish students.

## 3. Results

The results of the research study are presented in the order corresponding to the order of questions/issues asked in the student homework.

### 3.1. Question 1: How Do We Understand the Ideal Dairy Farm?

The original versions of the answers given by Erasmus+ students regarding the interpretation of the term ideal dairy farm are summarized in Table 1.

The responses presenting students' understanding of the concept of ideal dairy farm differ in length, the number of details provided, the depth of reflection, and the approach justifying the statement (Table 1).

The comparison of students' statements in quantitative terms (text volume) shows that the number of words used to present the interpretation of the ideal dairy farm ranged from 9 to 243 words (average 78 words), and the number of characters ranged from 37 to 1091 (average 375 characters). However, the qualitative assessment of the statements, showing how the students understand the ideal dairy farm, remains much more important. In fact, the theme of a juxtaposition of animals and humans appears in each student's study. Only Student 5 exposed only the role of the human being, namely the producer (farmer) and the consumer, in the context of their relationship with the ideal dairy farm. The majority of students indicated the need to seek balance/sustainability in the case of an ideal dairy farm, taking into account aspects of animal welfare, environmental protection, economic efficiency (profitability) and safety. An important issue of the approach to the assessment of dairy production in an ideal farm was pointed out by Student 3. Sentences starting with the word "If . . ." and examples given by the Student 3: "If a cow is in a good health . . .", "If the cows have access to pasture . . .", "if the cows are well-treated . . ." initiate a thought process leading to showing the results when we guarantee something to the cow. The chains of dependencies built on the basis of conditional sentences emphasize the essence of the logical explanation of the benefits achieved at the subsequent stages linking the level of milk production with the level of its consumption. Taking into account the structure of conditional sentences, the statement of positive effects in the main sentence is, however,

conditioned by the indication of the positive aspect in the subordinate sentence. In the subordinate sentences cited by the Student 3, this positive aspect concerns the cow.

**Table 1.** Interpretation of the term ideal dairy farm: answers prepared by Erasmus+ students.

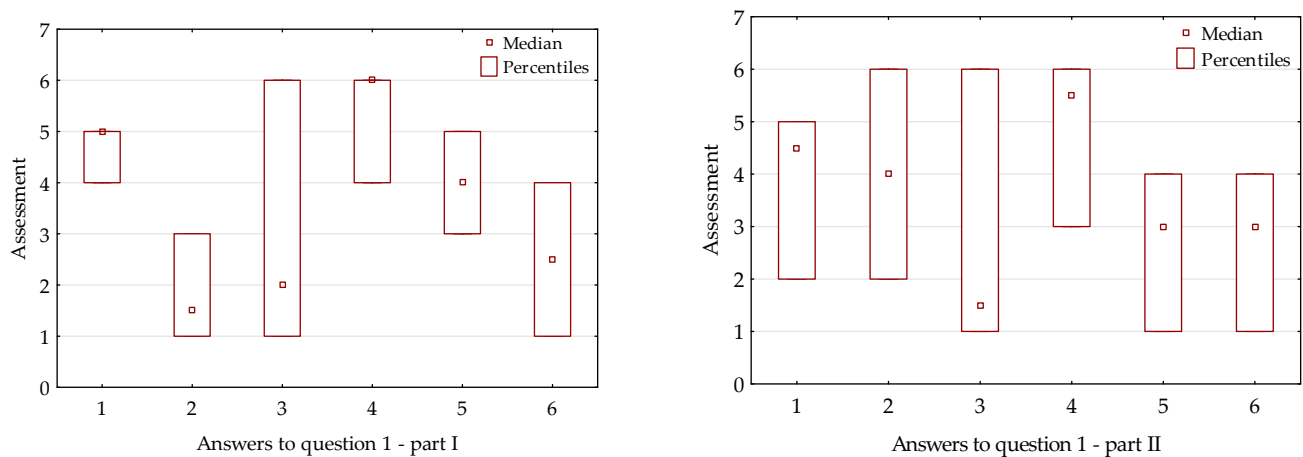
Student/Answer	The Content of the Interpretation
Student/answer 1	<i>For me, the ideal dairy farm is a farm that focus of the wellbeing of the animal and can produce enough milk of quality for the farmer to make enough money.</i>
Student/answer 2	<i>A dairy farm is a farm that produces milk or milk products such as manufacture of butter and cheese. Even if a dairy farm can have good production rates, its practices can have negative effects on environment, food safety and animal welfare. An "ideal" dairy farm is to me a sustainable farm that will keep a balance between its production, rentability and aspects such as workers safety, environmental issue, food safety and animal welfare and ethics. It combines profitability with responsibility of humans, animals' health and environment.</i>
Student/answer 3	<i>For me, an ideal dairy farm is one where there is a high level of animal welfare that means no mistreatment of livestock, animals have access to pasture, no injuries and they are not treated with synthetic hormones. I think that the farmer welfare is also very important in an ideal farm. With these two parameters, the productivity will be high. In my opinion, an ideal dairy farm is based on a virtuous circle. If a cow is in a good health (no mastitis, no lameness, no injuries), she will produce more milk and the farmer will have more input. If the cows have access to pasture, the produced milk will be of better quality and the farmer will receive a better salary thanks to the bonus. Thus, if the cows are well-treated, they produce more, and farmers are well-paid, so they also feel good. Moreover, I think that the robotization is also important in an ideal farm. Indeed, thanks to robot (milking robot, feeding robots) farmers can save more time for their family and for their hobbies. Furthermore, I think that an ideal dairy farm has to be sustainable that means have a low impact on the environment, a low footprint. Finally, for me, the ideal farm is a family farm which is passed from one generation to another with a little number of cows. I think that it is not important to have a big herd but 60 cows it's enough.</i>
Student/answer 4	<i>Good for the farmer and good for the animals.</i>
Student/answer 5	<i>The ideal dairy farm should be both satisfied by producers and consumers. It is indeed that there is difference between what producers and consumers demand. Therefore, how to make balance with these purposes is an important issue.</i>
Student/answer 6	<i>According to me, an ideal dairy farm is where social, economic and environment factors are all optimized. Autonomy and financial rentability are necessary to ensure a good quality of life to the farmer. I think that autonomy within a farm is obtained through agro-ecological practices of managing the life cycles of nutrient and increasing material exchanges between both animal and vegetable production.</i>

The ranking lists of answers prepared by students on the basis of the material in Table 1, developed in the next stage using the ranking method, are presented in Table 2. Table 2 also includes the results of the ranking of answers to question 2 and question 3. Students' answers to questions 2 and 3 with a short description are presented in Sections 3.2 and 3.3. A graphic illustration of the mean ranks of the answers assessed in question 1 for the accuracy of answers criterion (part I) and the criterion of the answer structure (part II) is shown in Figure 1.

The summary of the answers to three questions, prepared by the ranking method (Table 2) shows that the lowest total sum of ranks was obtained by the answers 3. Thus, the answers 3 (represented by Student 3) were at the top of the ranking. The next place in the ranking was taken by the answers given by Student 6, then ex aequo Students 2 and 5, then Student 4 and Student 1.

**Table 2.** Results of the assessment of answers to three research questions, developed by the ranking method.

	Student Assessment Based on the Criterion . . .						Overall Assessment of the Question	
	Answer	Accuracy of the Answer		Structure of the Answer		Sum of Ranks	Order	
		Sum of Ranks	Order	Sum of Ranks	Order			
Question 1	Answer 1	28	4	25	3	53	4	
	Answer 2	10	1	24	2	34	2	
	Answer 3	15	2	16	1	31	1	
	Answer 4	34	5	29	4	63	5	
	Answer 5	24	3	16	1	40	3	
	Answer 6	15	2	16	1	31	1	
Question 2	Answer 1	36	6	29	5	65	6	
	Answer 2	24	5	28	4	52	5	
	Answer 3	12	1	9	1	21	1	
	Answer 4	21	4	18	2	39	4	
	Answer 5	19	3	18	2	37	2	
	Answer 6	14	2	24	3	38	3	
Question 3	Answer 1	31	6	22	4	53	6	
	Answer 2	8	1	25	6	33	2	
	Answer 3	15	2	16	1	31	1	
	Answer 4	27	5	21	3	48	5	
	Answer 5	24	4	18	2	42	3	
	Answer 6	21	3	24	5	45	4	

**Figure 1.** Box-whisker charts for the mean ranks of the assessed answers in question 1 for the accuracy of answers criterion (**part I**) and the criterion of the answer structure (**part II**).

The results of the Kruskal-Wallis test for the answers to question 1 are as follows:  $H(5, n = 36) = 23.33, p = 0.0003$  (for the accuracy of the answer) and  $H(5, n = 36) = 9.11, p = 0.1047$  (for the answer structure criterion). For the evaluation of the answers according to the criterion of their accuracy, the differences in the assessment between the answers 2 and 1 and 4, and also between the answers 4 and 3 and 6 turned out to be significant. In the assessment of the structure of answers to question 1, no significant differences were found, because  $p > 0.05$ .

### 3.2. Question 2: Criteria for Considering an Ideal Dairy Farm: Student Opinions

The answers given by the students regarding the criteria taken into account in the considerations on the ideal dairy farm are summarized in the original version in Table 3.

**Table 3.** Student answers to the question: On the basis of what criteria can the ideal dairy farm be considered?

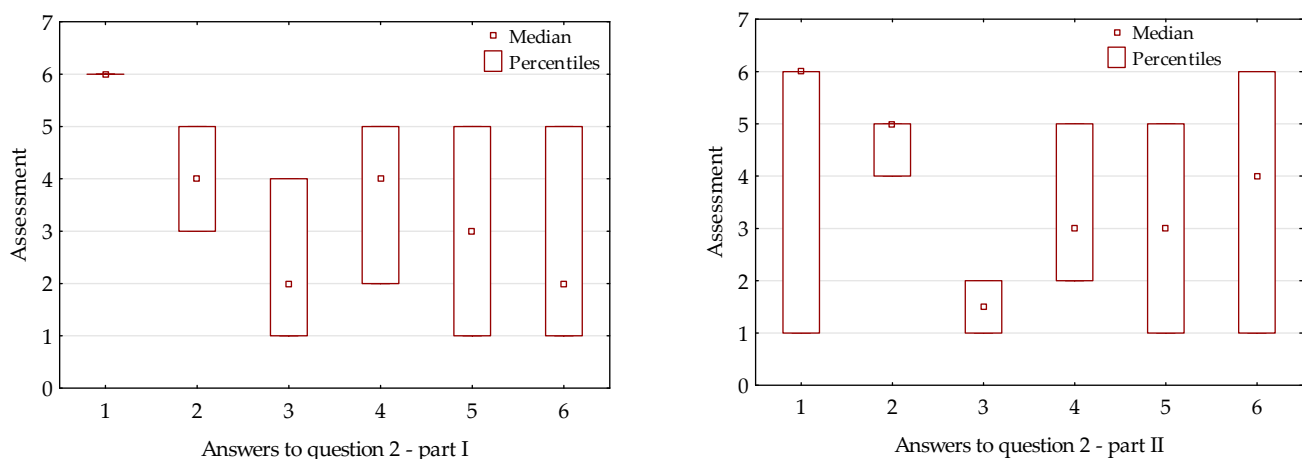
Student/Answer	The Content of the Interpretation
Student/answer 1	<i>I think the ideal farm can be considered on the basis on animal wellbeing.</i>
Student/answer 2	<i>To my mind, an ideal dairy farm can be considered on the basis of water access, pasture access, cow-calf separation and shade access for cows. It is also important to consider milk quality with for example nutrients amount for the milk. Working hours for the farmer and safety. Energy amount such as fuel consumption and pollution rate such as gas emission. And also “classical” criteria such as milk production.</i>
Student/answer 3	<i>In my opinion, different criteria can be considered to define an ideal farm:</i> <ul style="list-style-type: none"> <li>• <i>The condition of cow: a good welfare based on the five freedoms (freedom from injuries, pain and diseases, freedom from hunger and thirst, freedom from discomfort, freedom to express normal behavior, freedom from fear and distress);</i></li> <li>• <i>The welfare of the farmer;</i></li> <li>• <i>The profitability of the farm: high input, milk yield, share of fat and protein in the milk;</i></li> <li>• <i>Sustainability: limit the impact on the environment.</i></li> </ul>
Student/answer 4	<i>It’s complicated, each people have a different opinion about “THE ideal”, but it is necessary to combine practicality for the farmer, and comfort for the animals. As:</i> <ul style="list-style-type: none"> <li>• <i>a well-appointed milking parlor which facilitates milking for the farmer,</i></li> <li>• <i>robot cleaning of the cow building (cow comfort + farmers),</i></li> <li>• <i>outside access for cows,</i></li> <li>• <i>many accessories can come to reinforce the comfort of the cows, like scrapers . . .</i></li> </ul>
Student/answer 5	<i>The condition of cow, such as health, milk yield, animal welfare (freedom, happiness). The environment, such as temperature, humidity, cleanness, well draughty, high comfort level, hygiene. The management, such as to disinfect of tools, record the condition, high mobility, sustainability. The profit, such as low labor hour, high mechanization.</i>
Student/answer 6	<i>The criteria to take into account depend on ethical, economic, environmental and social values. The economic rentability is the first criterion to make the farm operational. The social point of view is then very important, is the breeder’s workload reasonable? Are his working conditions correct and allow him to flourish? This criterion is important to assess the sustainability of the farm in time. Nevertheless, sustainability over time is also depending on the environmental and the ecological impact of the farm activities. Therefore, direct and indirect emissions of the farm, and all kind of releases and energy use have to be managed precisely. Last but not least, animal welfare is a key factor to make the farm “ideal”, indeed, this issue has an important impact on the production, but also on the farmer. I think cow well-being is directly related to human and the breeder well-being.</i>

As in the case of the answer to the first question, the students showed different inventiveness in presenting the criteria for considering the ideal dairy farm. The comparison of this invention in quantitative terms showed the following facts: the number of words used in an individual text was from 14 to 146 words (average 70 words), while the number of characters ranged from 61 to 754 characters (average 368 characters). In quantitative terms, we can also consider the number of criteria listed by each student. Student 1 provided only one criterion, i.e., animal wellbeing. In the answers given by other students, there were many more criteria for considering the ideal dairy farm.

The answers given by students also differ in terms of quality. This quality is related, for example, to the way the students presented the criteria taken into account when discussing the ideal dairy farm. The opinions were presented by students in a descriptive and bulleted form, which translates into the ease of distinguishing the number of given criteria, as well as the unambiguity of their formulation. It can be indicated that the students’ answers take into account the general and specific approach to the criteria for presenting the ideal dairy farm. The general approach involves the use of general concepts as criteria for considering an ideal dairy farm. A feature of the general criteria is that they include specific criteria, and these were also mentioned by the students. The only debatable issue here is to what extent the students were able to distinguish general criteria, and within general criteria—specific criteria. For example, Student 5 mentioned the general criteria: environment, management and profit, and these were expanded with specific criteria. Student 6, on the other hand,

gave ethical, economic, environmental and social values as general criteria, which she then developed for details. In the statements of two students (Students 3 and 5), the condition of cow appeared as the general criterion. At this point, however, it is worth paying attention to one important fact: what are the details of the condition of cow in the understanding of each student. These details vary between students. Student 3 indicated that the general criterion of cow condition is related to good welfare and includes five freedoms. On the other hand, Student 5 mentioned health, milk yield, animal welfare (freedom, happiness) as part of the same-named general criterion (the condition of cow). Some students focused only on the specific criteria. Student 2, regarding the considerations of the ideal dairy farm, mentioned water access, pasture access, cow-calf separation, shade access for cows and others as criteria. Student 4 also drew attention to access, however she formulated it as outside access for cows. In addition, among the detailed criteria, she focused on those related to the mechanization of dairy production on the farm, which translate into the comfort of both cows and the farmer. Student 4 pointed to one more important aspect in the context of the discussion, namely that each person can have a different opinion and understanding of the concept of “ideal”.

The ranking lists of answers prepared by students on the basis of the material in Table 3 developed in the next stage using the ranking method, are presented in Table 2. A graphic illustration of the mean ranks of the answers assessed in question 2 for the accuracy of answers criterion (part I) and the criterion of the answer structure (part II) is shown in Figure 2.



**Figure 2.** Box-whisker charts for the mean ranks of the assessed answers in question 2 for the accuracy of answers criterion (part I) and the criterion of the answer structure (part II).

The results of the Kruskal-Wallis test for the answers to question 2 are as follows:  $H(5, n = 36) = 20.44, p = 0.0010$  (for the accuracy of the answer) and  $H(5, n = 36) = 15.78, p = 0.0075$  (for the answer structure criterion). For the evaluation of the answers according to the criterion of their accuracy, the differences in the assessment between the answers 1 and 3 and 6 turned out to be significant. However, in the case of the second criterion, differences in assessment between answers 3 and 1 and 2 turned out to be significant.

### 3.3. Question 3: Differences in Understanding the Ideal Dairy Farm between Farmers (Owners of Dairy Farms) and Consumers as Assessed by Students

The intention of the third question addressed to students was to put themselves in the role of a farmer and a consumer, in order to indicate the differences in understanding the idea of an ideal dairy farm from these two perspectives. Each student was and is a consumer. At the same time, each student—due to the field of study—has her own experience related to agriculture. Such preconditions were a premise for the formulation

of the question about the differences in the interpretation of the ideal dairy farm between consumers and farmers.

Detailed responses of students participating in the study, showing differences in the understanding of the ideal dairy farm by farmers and consumers, are summarized in the original version in Table 4.

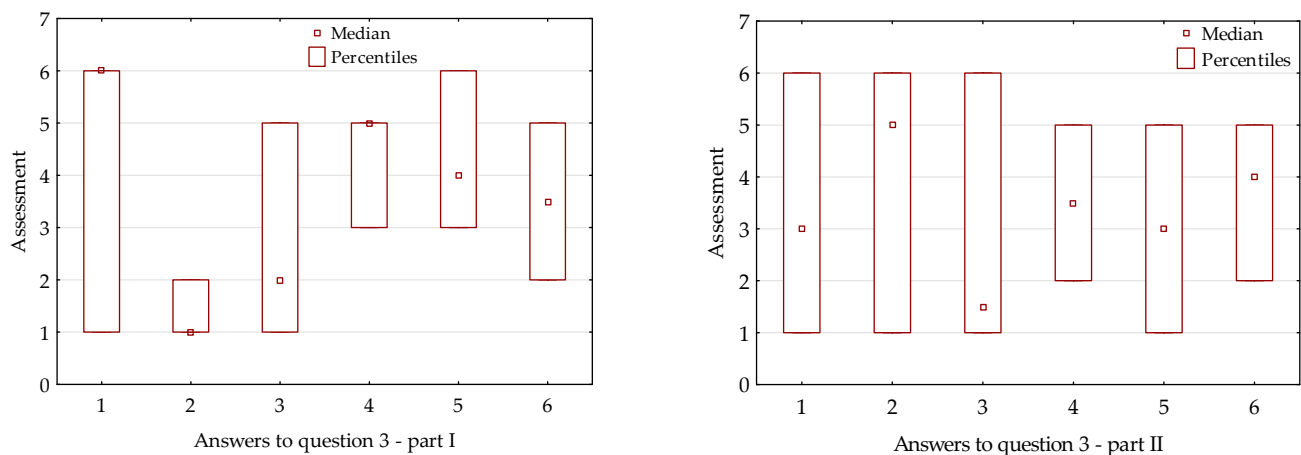
**Table 4.** Student responses to the question: In your opinion, the understanding of an “ideal” dairy farm may differ between farmers (dairy farm owners) and consumers? Justify the answer.

Student/Answer	The Content of the Interpretation
Student/answer 1	<p><i>For the farmer the ideal farm may be a farm that produce a milk of quality in big quantity, at small cost. For the consumer, they will maybe prefer a farm that focus on the wellbeing of the animal and that produce a milk of quality.</i></p>
Student/answer 2	<p><i>In my opinion “ideal” differs between farmers because we don’t have the same “priorities” and the same sensibility. For example, some farmers will understand it as the animal welfare only, while others will understand it as environmental aspects. It is the same between farmers and consumers. I think consumers will pay more attention on welfare issues and milk quality while farmers will pay also attention on workers safety and rentability, economic aspects. There is a study of the American Dairy Science Association that shows that milk quality is the criteria the most cited by citizens while economic issue is the most cited by farmers. Animal welfare is a criterion that seems to be pretty much mentioned by everyone [16].</i></p> <p><i>There are also some criteria that are not perceived the same way between consumers and farmers, as for example the fact if dairy calves should be separated from the cow within the first few hours after birth. A study show that 60% producers say “yes”, 100% of veterinarians say “yes”, 60% of students say “yes”, 95% of animal advocate say “no” and 90% of non-dairy say “no”. That shows a huge difference on the perception of positive or negative effect on a criterion [27].</i></p>
Student/answer 3	<p><i>In my opinion, for the farmer, the main purpose is to make the biggest profit. They want to produce more at lower costs and to enhance the selling price as high as is possible. An ideal farm for the farmers is also an ergonomic farm where there is not risk of injuries and a farm that allows them to save more time and thus spend more time with their family.</i></p> <p><i>In contrary, for the consumers, the arguments are different to define an ideal farm. For them, I think that the most relevant criteria for an ideal farm is the animal welfare. Indeed, consumers are very careful about it and they don’t want to drink milk that comes from a farm where animals are not well-treated. For example, the number of supermarkets that sells battery-raised chicken eggs because consumers don’t want to buy and eat this kind of products. Moreover, I think that consumers want also to have a milk that comes from a clean farm and where farmers limit the use of antibiotics. Consumers are more and more worry about the antibiotic resistance and its transmission from animals to human that’s why they are attentive to that.</i></p>
Student/answer 4	<p><i>Of course</i></p> <p><i>For a farmer the ideal farm is functional, it makes his job easier.</i></p> <p><i>For consumers, the ideal farm is one where the animals are happy, peaceful and healthy. But the farmer also wants these animals to be happy.</i></p> <p><i>I would say that in the end, in the farmer’s ideal farm would be to think of him and his animals while the consumers’ ideal farm would only care about the welfare of the animals.</i></p>
Student/answer 5	<p><i>For the farmers, the purpose might be to make the biggest profit. They will consider how to lower the production cost and enhance the selling price as high as they can. Therefore, they will cultivate high milk production cow breed and make the farm suitable for cows to produce milk.</i></p> <p><i>For the consumers, the purpose might be to get the best price–performance ratio. In other word, they are looking for the product with high quality and low price. Some customers care about animal welfare. Also, the research indicated that happy cow produce better milk. Therefore, they will be looking for the milk that is produced by well treated cows. They also want the farm to be clean; because they don’t want the milk being polluted.</i></p>
Student/answer 6	<p><i>I think that both point of view may be similar because the understanding of “ideal” should be objective and based on multiple criteria. If the consumer only has access to the final product of a dairy farm—milk, cheese, yogurt or whatever—he/she knows that the quality is plural and it results from the choices of the breeder. If the breeder has a good quality of life, a reasonable income and workload, he/she can then think of improving certain parameters which will not have a direct effect on his own comfort (improve animal welfare, food sourcing, energetic cost . . . ). These improvements are responsible for final consumer satisfaction. If their expectations are different, they nevertheless lead to the same social, environmental and economic objectives.</i></p>

Students showed a varied idea to develop the problem of differences in understanding the ideal dairy farm by farmers and consumers. This indirectly translated into the length of the statement, ranging from 46 to 207 words (average 129 words) and from 187 to 1029 characters (average 611 characters). The students' opinions also differ in terms of the manner of providing information. Some students (Student 1, 3, 4 and 5) referred to each of the considered groups of people and their understanding of the ideal dairy farm in separate paragraphs. The other students presented their views in the form of a classic discussion.

In the opinion of half of the students (Student 1, 3 and 5), the farmers' interpretation of the ideal dairy farm is dominated by factors determining the profitability of production. Students paid attention to the low production costs, high milk production efficiency, high milk quality and high purchase price, which can be used by farmers when presenting their vision of an ideal dairy farm. Some students also emphasized the important role of factors that facilitate work on a dairy farm, reduce working time and increase its safety, taking into account selected aspects of ergonomics. Student 2 pointed out that there may however be differences in priority and sensitivity among farmers. Hence, for some farmers, animal welfare will be crucial in an ideal dairy farm, and environmental aspects for others. An interesting summary of considerations about the farmer and the ideal dairy farm was presented by Student 6. In her opinion, if the farmer achieves a high level of quality of life, reasonable income and workload, then in such a situation he/she is able to think about improving certain production factors that do not directly affect for his/her own comfort, while improving animal welfare, energy efficiency, etc.

The ranking lists of answers prepared by students on the basis of the material in Table 4 developed in the next stage using the ranking method, are presented in Table 2. A graphic illustration of the mean ranks of the answers assessed in question 3 for the accuracy of answers criterion (part I) and the criterion of the answer structure (part II) is shown in Figure 3.



**Figure 3.** Box-whisker charts for the mean ranks of the assessed answers in question 3 for the accuracy of answers criterion (**part I**) and the criterion of the answer structure (**part II**).

The results of the Kruskal-Wallis test for the answers to question 3 are as follows:  $H(5, n = 36) = 19.44, p = 0.0016$  (for the accuracy of the answer) and  $H(5, n = 36) = 3.33, p = 0.6487$  (for the answer structure criterion). For the evaluation of the answers according to the criterion of their accuracy, the differences in the assessment between the answers 2 and 1 and 4 turned out to be significant. The other differences were insignificant.

### 3.4. An Overview of the State of Knowledge on the Ideal Dairy Farm in Studies Prepared by Erasmus+ Students

The last task for Erasmus+ students, including the elaboration of an overview of the state of knowledge about the ideal dairy farm, is summarized in Table 5.

**Table 5.** Characteristics of the material prepared by Erasmus+ students, introducing the reader to the subject of the ideal dairy farm, including citations.

Student	Number of Characters	Number of Words	Number of Paragraphs	Number of Sub-Headings	Citations/References		
					Number	Language	Source
Student 1	2875	587	7	0	3	3 × E	2 × J 1 × L
Student 2	4493	868	6	0	5	4 × E 1 × F	5 × L
Student 3	5487	1075	13	5	6	4 × E 2 × F	6 × J
Student 4	3607	749	19	3	4	2 × E 2 × F	4 × L
Student 5	5053	891	11	5	4	4 × E	3 × J 1 × C
Student 6	6180	1191	14	1	2	1 × E 1 × F	1 × J 1 × L

Explanation of symbols: E—English, F—French; J—scientific journal, C—conference article, L—link to the on-line version.

The studies prepared by the students included an average of 4616 characters, 894 words, based on an average of 12 paragraphs. Each student cited an average of four publications (source materials). Students cited an average of three articles in English and one article in French, with two students citing publications in English only. Two students included references to online materials in their studies, while one student used only scientific journals in their considerations. Each of the other three students referred to at least one journal article and an article from another source. Only one student used the conference materials. Going into detail, four students cited the publication by [9], three students took into account the paper by [18], and two students cited the study by [28]. Two students using only the on-line articles cited the study on the ideal dairy farm from the Progressive Dairyman website.

### 3.5. Assessment of the Approach of Polish Students to an Ideal Dairy Farm Based on Keywords

Figure 4 illustrates the frequency of use of certain keywords by Polish students when answering three questions about the ideal dairy farm.

**Figure 4.** A keyword cloud created on the basis of Polish students' answers to three questions about the ideal dairy farm.

The set of keywords includes several characteristic groups, ranked from the highest to the lowest frequency of use in materials developed by Polish students (Figure 4). The first group includes the keywords with the highest frequency of use in answering three questions. These are, in order of the word: animal, quality, cow, production, product, and milk. The next (in terms of frequency of use) group of keywords includes words related to the assessment of dairy production on the farm, i.e., modern, cost, size, technology and automation. The words least frequently used by Polish students in answering three questions about the ideal dairy farm were: freedom, sustainability, pain, ethical, antibiotics and organic.

In the studies by [18], the respondents when asked about the issue of the ideal dairy farm most often used the following keywords in their answers: production and milk. The keyword “production” was most often mentioned by farmers and advisers, while “milk” by lay citizens. According to Polish students, the keyword “milk” came sixth in terms of frequency of use in the developed materials. “Milk” is a kind of bridge between producers and consumers. That is why it was mentioned in a key place by farmers, advisers and lay citizens in the studies by [18], as well as in the presented research with the participation of students. However, the students, compared to “milk”, assigned a greater role to other terms related only to the farm, that is farmers, cows and animals. Cow as the main area of interest of respondents not affiliated with the dairy industry was indicated in the studies by [9]. In the current research on the ideal dairy farm, students used both the term cow and animal with high frequency.

#### 4. General Discussion

Albert Einstein said [29]: “Most teachers spend time finding out what their students don’t know. Meanwhile, the real art of asking questions is finding out what the learner knows or is able to find out”. Numerous studies undertaken in the field of agriculture and its individual divisions, including dairy production, fit into the quoted statement. One of the characteristic features of planned research in dairy production is asking questions aimed at recognizing the state of knowledge, attitudes and awareness of people involved in production (farmers, advisers) and those benefiting from the effects of production (consumers). Such issues—questions like: “Citizens’ views on the practices of zero-grazing and cow-calf separation in the dairy industry: Does providing information increase acceptability?” [30], “What do you consider to be an ideal dairy farm and why are these characteristics important to you?” [9,18] and “Do citizens and farmers interpret the concept of farm animal welfare differently?” [31] are examples of identifying research problems important for the development of dairy production. The questions posed in this research study were also intended to show the development of dairy production, in this case from the perspective of students answering questions about the ideal dairy farm. The idea that individual students should rank the answers to given questions was aimed at making them aware of the current state of knowledge about the ideal dairy farm, but also confronting them with the knowledge of other students. In this way, we wanted to get closer to the idea expressed at the beginning of the paragraph to see what we can learn more, knowing our current state of knowledge. This approach to assessing students’ own knowledge, after participating in an Erasmus+ course, is an alternative solution to other methods of knowledge assessment, presented, for example, by [32,33].

In a survey by [9] one complex question (consisting of two parts) was formulated: What do you consider to be an ideal dairy farm and why are these characteristics important to you? In the presented study, the basic issues related to an ideal dairy farm were formulated in the form of two problems. The first (discussed above) was about understanding the ideal dairy farm. The second, on the other hand, suggested distinguishing criteria taken into account when considering the ideal dairy farm. The intention of this approach to the research was to verify, on the basis of the question about the criteria for evaluation, the answer concerning the understanding of the ideal dairy farm. An additional argument justifying the question about the criteria that can be used to define an ideal dairy farm was

provided by Student 4. This student replied to the first question about the ideal dairy farm: “Good for the farmer and good for the animals”. Of course, in this case, we can ask in what categories to interpret the term “good” and what the author meant by “good”. It is hoped that the answer to the second question will clear up these doubts.

Examples of surveys on the ideal dairy farm show the inclusion of various social groups in this research, including people not related to the dairy industry [9], dairy farmers, agricultural advisors and lay citizens [18]. The presented results of research with the participation of students, as the next group, join the mainstream of considerations on the ideal dairy farm. The views of the student group confirmed the special role of animal welfare in judging the ideal dairy farm, as well as the differences in the priorities of farmers and consumers. Developing the topic of animal welfare, [34] asked students representing various fields of study about the ideal farm with animal production. In response to the question “An ideal farm with animal production is in your opinion a farm that puts priority as following . . . ”, on average 83% of students chose the answer “Maintaining the highest standards of comfort and welfare of livestock”. Interestingly, this response option was supported by 100% of medical students and only 67% of polytechnic students. The differences in the priorities of farmers and consumers regarding the ideal dairy farm, identified in the presented own research, were consistent with the research results obtained by [18]. In the cited studies, the opinions of farmers emphasized mainly the factors determining the economy and profitability of production in an ideal dairy farm. The convergence of the results of the authors’ own and the cited studies also applies to consumers (lay citizens in the cited work) in terms of putting milk quality and animal welfare first. In own research, the opinions of consumers regarding the quality of milk were also extended to include issues of farm cleanliness. Thus, the quality of milk was interpreted by students in terms of microbiological quality, which is the result of maintaining hygiene standards on the farm. Meanwhile, milk quality can also be viewed in terms of fat and protein content, which translates into the value of dairy products on the market. Therefore, it seems important to clarify the concept of “milk quality” in research with consumers (and not only), by raising the issue of what aspects of quality are considered by the respondents.

Participation in the current research of a selected group of students is in line with the tendency to expand the group of people speaking on important issues related to dairy production. In the cited studies on the ideal dairy farm, questions were addressed to specific social groups: dairy farmers, agricultural advisers and lay citizens [18]. In other studies [35] not only farmers but also veterinarians were asked about the welfare prospects of dairy cattle. An interesting approach to the identification of social groups participating in research in the area of animal production evaluation is presented in the work of [36]; the authors distinguished four stakeholder groups, i.e., academics, professionals, practitioners and enthusiasts. These stakeholder groups can be the basis for an additional description of the target group of respondents, their self-assessment in other studies, but also for initiating a dialogue between science and society in the field of animal welfare [37]. Ref. [38] developed a discussion on the moral implications of farm animal welfare by differentiating the roles of consumers and citizens. The separation of consumers (who, through their purchasing behavior, influence the market) and citizens (who are participants in the process of shaping public opinion) is another example of identifying research groups. These social groups and selected aspects of animal welfare in the willing-to-pay study were included in the studies by [39]. An example of yet another group related to animal welfare research are economists, for whom [40] asked the question: How can economists help to improve animal welfare? In turn, [41] presented public and farmer perceptions of dairy cattle welfare in the United States. The review of questionnaire surveys in the field of agricultural production shows an increasingly detailed approach to formulating respondent groups. An example is the social group of students. In ref. [34], within this group, additionally took into account the specialization of students (studying humanities, polytechnic, medical, economic, artistic and life sciences) asked about animal welfare. Ref. [20] in assessing the knowledge about the welfare of dairy cattle included students from 10 different faculties.

Being among the participants of research included in the education process [42], considered schoolchildren aged 13–14 to evaluate the success of education including elements of farm animal welfare. Including animal welfare knowledge in the education process of the young generation may bear fruit at a later stage in the education of students. This was confirmed by students in the current study, who took into account welfare in the presentation of an ideal dairy farm. A factor contributing to student interest in welfare is the evolution of animal welfare, ethics and law education in European Veterinary Schools [43].

In the presented considerations on the social groups covered by the study, regardless of the size of these groups, the theme of animal welfare figures prominently. Animal welfare has been the subject of many detailed assessments, not only in livestock housing, but also in surveys and literature reviews. The long history of animal welfare research [44] is accompanied by an increasing set of factors taken into account in research studies. Linking animal welfare to farm size [45], sustainability [46], equipment with modern milking systems—milking robots [47], or ethical aspects [48] is an example of the role that welfare plays in the assessment of animal production. A broad spectrum of factors highlights the role of science and scientific concepts in improving knowledge about animal welfare [10]. Scientific concepts aim to answer numerous questions, including those concerning the place of animal welfare in the concept of farm functioning, including the dairy farm. One of the directions of searching for answers to questions about the essence of animal welfare seems to be the development of the issue of an ideal dairy farm. Questions about the ideal dairy farm broaden the approach to research so far, as animal welfare is included in an ideal dairy farm. This was confirmed by the studies by [9,18] and a presented research study with students in which animal welfare was mentioned as one of the main keywords. By inquiring about the ideal dairy farm, the background for considering animal welfare is provided. The importance of welfare compared to other production factors on the farm is expressed, for example, by the aforementioned comparison of keywords and their frequency of use. Another important aspect is to indicate in the list of keywords how far apart (taking into account the frequency of use) “welfare” and other words associated with welfare are from each other. A possible case is also when the keyword “welfare” appears in the assessment of an ideal dairy farm and at the same time there are no keywords strongly associated with welfare. Hence, there is a need to present welfare issues in such a way as to highlight the factors that have the greatest impact on animal welfare or that can be identified with animal welfare. For example, a question could be asked: Do students associate animal welfare with comfort? The answer is given in the keyword cloud (Figure 4).

When asking about the ideal dairy farm, many alternative questions can also be raised. Such alternative questions arise from the review of keywords in students’ work. An alternative question can be asked: Which factors strengthen and which weaken the vision of the ideal dairy farm? Antibiotics can certainly be included among the main factors weakening the image of an ideal dairy farm. The frequency of using the word antibiotic was very low in the homework of Polish students (Figure 4). In the studies by [9], 22% of respondents rejected the use of antibiotics and exogenous hormones as means to increase milk production. In the studies by [9], regarding the ideal dairy farm, respondents also repeatedly emphasized the importance of the term “natural” in relation to the cow, feed, available forage area (pasture), diet, milk, behavior and the general desire for a natural life. The importance of natural life, particularly with regard to public perception of animal welfare, was developed by [49]. In the context of animal welfare, the benefits of animal access to natural pasture resources were highlighted by citizens in a study by [37,50]. The positive attitude of society to technologies that provide cows with access to pasture was shown in the research by [51]. These examples confirm the importance of the society’s preference for naturalness, but also tradition and modernity in dairy production [52]. The importance of modernity for an ideal dairy system was also noted by the respondents in the [9].

Acceptance for the technical equipment of an ideal dairy farm, and on the other hand, objections to a large number of equipment in the dairy production of the farm indicate

the need to seek compromise solutions. Modern technical solutions support the farmer's work in handling animals and at the same time have an impact on the welfare of dairy cattle. A characteristic tendency in the context of welfare is the desire for animals to have a more gentle and comfortable contact with equipment, including lying stalls [53], the neck-rails [54], the floor [55], feeding space [56], or drinkers [57]. An example of improving the comfort of cows in the milking robot is such a construction of the milking stall that the cow enters and exits straight (Lely A4) without having to turn to the gates in the side wall. The improvement of animal welfare also includes the development of devices for maintaining thermal and microclimatic conditions in the barn [58], including sprinklers [59] and a ventilation system [60]. When addressing the issue of "technical equipment versus animal welfare" one can also raise the issue of "technical equipment versus the ideal dairy farm". The second of the issues given more precisely locates the role of technical equipment in modern dairy production. This is a key support role for both the animals and the farmer. Among the many effects of this support, the most important is the reduction of labor inputs and physical workload of farmers [61,62], which translates into farmers' satisfaction [63]. When considering the issue of farmer satisfaction, the question of cow satisfaction seems justified. The answers can be sought in relation to animal welfare. Determining the relationship between animal satisfaction and technical equipment remains an issue, which may be the subject of further research. The degree of meeting the expectations related to the satisfaction of the farmer and animals may be one of the determinants of the assessment of an ideal dairy farm. The process of meeting the requirements also includes the technical equipment of farms, especially if it is considered in the context of meeting the recommendations in housing systems that improve animal welfare [64,65]. The index of technical standards fulfillment (ITSF) proposed by [66] is an example of a practical approach to assessing the differences between current housing conditions created by barn facilities and some standards. Another example relating to the standards are standard operating procedures (SOP), required on farms participating in animal welfare assurance programs [67].

Building a vision of an ideal dairy farm, premises are created for comparison with this vision of the current state of dairy farms. In this way, it will be possible to indicate the scope of tasks to be performed that will improve the existing dairy farms and their development in line with the idea of the three pillars of sustainability [68]. The vision of an ideal dairy farm is built on the basis of numerous studies, including the opinions of various social groups, not only people directly involved in dairy production, but also other consumers. Of course, the more opinions, the more accurately the image of an ideal dairy farm can be built. A survey on the ideal dairy farm by [18] included 107 farmers, 170 advisers and 280 lay citizens. In a survey by [9], the responses of 468 people not directly related to the dairy industry from 46 US states were included. Developing the tendency to expand the respondents' area of origin [69], surveyed the animal welfare attitudes of 5508 consumers from 13 Eastern European countries. Nationally, when examining the expectations of Brazilian citizens regarding the welfare of dairy cattle [70], took into account 228 responses collected through the survey. The use of a survey questionnaire is one of the most common approaches to gathering views on both the ideal dairy farm and animal welfare [9,18,71]. Especially if the survey allows researchers to collect a large number of opinions. In our study, however, we used a different approach, i.e., homework prepared by students on the ideal dairy farm. The homework was prepared by 6 students, because so many people participated in the Erasmus+ course. Thanks to such a number of people, it was possible to achieve an additional research goal, i.e., to evaluate the students' own knowledge about the ideal dairy farm in comparison with other students. This way, knowing their current state of knowledge, the students could identify what they might know more. Determining the ranking of answers within individual questions would be significantly difficult with a very large number of people participating in the study. The distinguishing feature of the approach to research in the form of homework is the time planned for its preparation.

Students had 4 weeks for this task. For example, in the studies by [70], about 15 min were allowed to complete the questionnaire with a single person.

Regardless of the approach to research, the focus remains the subject of research, i.e., the ideal dairy farm. Creating a vision of an ideal dairy farm is part of the process of formulating the prospects for milk production. Many elements of dairy production are involved in considering the future, including livestock systems and animal welfare [72], as well as advanced technologies [73]. An important role in meeting the current and future needs of dairy farms is played by systematic research [74], but also advance in teaching dairy production [75], taking into account the modern approach to education about dairy production and management [76]. Recognition of the current needs in connection with the perspective vision of dairy farms involves taking into account a wide spectrum of factors [7] that will ensure the sustainable development of dairy production in the food economy transformation chain [77].

In general, assigning homework to students is one of the well-known and recognized approaches to activating young people in the learning process, both in the classroom and online [78,79]. It is a question of how the next step, i.e., the assessment of the homework, is carried out. Most often, homework is assessed by the lecturer/teacher who also gives a grade according to the criteria used to differentiate the quality of homework responses. In our case, however, we proposed a completely different approach to the assessment of homework. The lecturer had access to the homework and supervised the further homework procedures. This procedure included an assessment of homework by the students themselves based on the ranking.

The time of the Covid-19 pandemic is an opportunity to improve the learning management system [80], create teaching strategies, engage students in learning and create a self-assessment concept [81]. Developing these issues, in our research we proposed an approach to the assessment of knowledge improvement on the example of a small group of students. The results of the observations indicate that conducting classes in small groups of students encourages them to be actively involved and at the same time plays an important role in mitigating the effects of Covid-19 on student learning [82]. At the same time, the question is not only of who you teach but how you teach [82] taking into account elements of educational technology and high and low achieving students [83]. The suggestions on how to teach show the effectiveness of small group association with collaborative learning and team work, especially in engineering and technology classes [84].

## 5. Conclusions

Erasmus+ students have demonstrated a diverse approach to presenting their understanding and knowledge of the ideal dairy farm. Very short opinions of some students were intertwined with in-depth thoughts of others. Regardless of the length of the opinions, most of them had a keynote emphasizing the relationship between humans and animals. By presenting their homework, students showed how different ideas can be to demonstrate differences in understanding the ideal dairy farm by farmers and consumers.

Research on a small group of people is certainly limited in scope. The relatively small number of Erasmus+ students in the group became an inspiration to propose a research method aimed at provoking reflection and evaluation of students' own knowledge in comparison with other people. Stimulating reflection on students' own knowledge may become a contribution to its improvement, and in the next stage to assess the effects of this improvement.

Polish students, in their homework on the ideal dairy farm, mainly used the basic concepts related to dairy production. Unfortunately, a very small number of students used terms that represent a responsible approach to dairy production, including ethical aspects, freedom, sustainability, animal pain, antibiotics, and organic milk production. This indicates the need to include classes in the study program that will allow to raise the awareness of young people in the field of contemporary problems of dairy production.

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