Lesson Title – How Can Pearson Squares Be Utilized to Calculate a Ration?

Length – 42 minutes

Standards and Benchmarks Addressed-

AFNR Career Cluster – Animal Systems Career Pathway Content Standards

Lesson 5.5 will address parts of the following performance elements:

AS.03. Performance Element: Provide for the proper health care of animals.
AS.04. Performance Element: Apply principles of animal nutrition to ensure the proper growth, development, reproduction, and economic production of animals.

AFNR Career Cluster – LifeKnowledge® and Cluster Skills Content Standards

Lesson 5.5 will address parts of the following performance elements:

CS.06. Performance Element: Examine the importance of health, safety, and environmental management systems in organizations and their importance to performance and regulatory compliance.
CS.11. Performance Element: Scientific Inquiry: Utilize scientific inquiry as an investigative method.

National Science Education Standards

Unifying Concepts and Processes: As a result of activities in grades K-12, all students should develop understanding and abilities aligned with the following concepts and processes:

- **Evidence, models, and explanation**
- **Constancy, change, and measurement**

Life Science – Content Standard C: As a result of their activities in grades 9-12, all students should develop understanding of

- **Matter, energy, and organization in living systems**

Science and Technology – Content Standard E: As a result of their activities in grades 9-12, all students should develop understanding of

- **Abilities of technological design**
- **Understandings about science and technology**

Common Core State Standards for High School Mathematics

Conceptual Category – Number and Quantity

The Real Number System	Extend the properties of exponents to rational exponents.

The Real Number System	Use properties of rational and irrational numbers.
Quantities	*Reason quantitatively and use units to solve problems.
The Complex Number System	Perform arithmetic operations with complex numbers.

Conceptual Category – Algebra

Seeing Structure in Expressions	*Write expressions in equivalent forms to solve problems.
Arithmetic with Polynomials and Rational Expressions	Use polynomial identities to solve problems.
Creating Equations	*Create equations that describe numbers or relationships.
Reasoning with Equations and Inequalities	Understand solving equations as a process of reasoning and explain the reasoning.
Reasoning with Equations and Inequalities	Solve equations and inequalities in one variable.
Reasoning with Equations and Inequalities	Solve systems of equations.

Conceptual Category – Functions

Interpreting Functions	*Analyze functions using different representations.
Building Functions	*Build a function that models a relationship between two quantities.
Linear, Quadratic, and Exponential Models	*Construct and compare linear, quadratic, and exponential models and solve problems.

Common Core State Standards for English Language Arts

College and Career Readiness Anchor Standards for Reading

Key Ideas and Details	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
Integration of Knowledge and Ideas	Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.

College and Career Readiness Anchor Standards for Writing

Text Types and Purposes	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
Production and Distribution of Writing	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Objectives - Upon completion of the lesson, students will be able to:

1. Complete a Pearson Square with 100% accuracy.
2. Calculate a recipe using calculations from a Pearson square with 100% accuracy.

3. Create a balanced mix of pretzels, chex, and M & Ms to teacher satisfaction.

Lesson Type -	Informational	**Operational**	Managerial	
Modalities Addressed -	**Visual**	**Auditory**	**Kinesthetic**	
Multiple Intelligences Addressed -	**Verbal-Linguistic**	Naturalist	Musical	Visual-Spatial
	Logical-Mathematical	**Interpersonal**	Intrapersonal	**Bodily-Kinesthetic**

Essential Vocabulary –

- ✓ As-Fed Basis
- ✓ Balanced Ration
- ✓ Diet
- ✓ Dry Matter
- ✓ Maintenance Ration
- ✓ Nutritionist
- ✓ Pearson Square
- ✓ Ration
- ✓ Supplement

Need of Lesson –

A ration is the total amount of feed an animal consumes in a 24-hour period. A ration should be formulated to provide the right amount and proportion of nutrients needed by the animal during its particular life stage. A diet refers to the ration without reference to a specific period of time. Diets should be based on the needs of the animal being fed and the nutrient content of the feed available.

A mature sow in lactation has different nutrient needs than a newborn piglet. These nutrient needs are called feeding standards. Feeding standards are based on average requirements and may not meet the needs under specific feeding conditions. Adjustments should be made if unusual conditions are present.

Providing animals with correctly balanced rations is important to an animal producer because the effects of overfeeding or underfeeding are harmful to the animals and costly to the producer. Feeding nutrients in excess decreases the profitability of the enterprise. Underfeeding nutrients can lead to weight loss, decreases in weight gain, and an overall decline in health. The livestock industry spends a great deal of time and money to ensure that animals are feed properly.

In this lesson, students will learn how to balance a ration based on the nutritional needs of an animal. They will also learn to account for the moisture content of feeds. Knowledge of formulating rations will be useful as students raise animals for their SAE projects as well as improving their understanding of personal nutritional needs

Materials –

Per Student:

- ____ Cups Chex Mix
- ____ Cups Pretzels
- ____ Cups M & Ms
- Measuring Cup
- Disposable Gloves
- Ziploc Bag
- Calculator

Resources (Community, etc)

Curriculum for Agricultural Science Education (CASE)-Animal Science Curriculum (Copyright 2012). www.case4learning.org

Pre-Class Set-Up –

All lab materials needed for today's lesson will be organized for students to retrieve at the front of the laboratory on a demonstrations table. Students will be responsible for obtaining all equipment needed for the lesson after the teacher demonstration.

Bell Work – *Please write the answer to your Bell Work on your weekly sheet.*

Complete the following Pearson Square:

- How much of each ingredient is needed to create a 35% ration utilizing corn with 25% protein and soybean meal with 48% protein? You need 2,000 pounds of feed.

Interest Approach –To review the approach of completing a Pearson Square, each group is tasked with creating a 10-step procedure on how to complete a Pearson Square. You must have exactly 10 steps written in a list format. When finished, trade your list with another group to verify the accuracy of your instructions.

Transition – Now that we have reviewed the procedure to complete a Pearson Square and calculate a ration, it's time to create your own recipe using the skills you have gained. Take the following items with you to the lab: Notebook, pen/pencil, and a calculator.

Summary of Content and Teaching Strategies –

Today we are going to be utilizing a Pearson Square to create an animal ration. Rather than just using 2 ingredients like we have yesterday, today's mixture will include 3 ingredients.

Step 1

Since we are utilizing some 'unique' feedstuffs, the percent protein of each feedstuff must be calculated. Using a calculator, work to calculate the percent protein of each feedstuff. Please raise your hand when finished. [Instructor will check accuracy of work].

Step 2

We are considering the pretzels and chex mix to be the "Premix" since there are 3 feedstuffs rather than 2. The premix needs a protein % of 7. Utilizing your information from above, calculate the needs of the premix. Raise your hand when finished. [Instructor will check accuracy of work].

Step 3

Now that the premix is calculated, we can use this information to mix the premix with the M & Ms. Remember, the final ration is to have a 6.5% protein. Complete your 2nd Pearson square to determine the quantity of each needed. [Instructor will check work as needed].

Step 4

The total amount needed for the ration is 2 cups. Using the percentages from the last Pearson square, you may now convert your Pearson square calculations into a measurable quantity using cups. Round your answers to the nearest 1/3 or ¼ cup. When finished, form a line at the back lab table to begin building your Chex Mix. When you have your Chex Mix created, please take a seat and complete your conclusion questions.

Learning Assessment – Before the end of class, the instructor will verify the accuracy of the recipe calculations. Once the instructor has verified the correct measurements, students will be permitted to create their Chex Mix while completing the conclusion questions. Conclusion questions will be valued at 10 points and evaluated during the next notebook check.
Cognitive Connect – Yesterday – What is a Pearson Square? Today – How Can a Pearson Square be Utilized to Create a Ration? Tomorrow – How are Computer Programs Used to Create Rations?

Adaptations/Accommodations for Special Needs – While the instructor is reviewing the laboratory procedure, he/she will instruct students to underline or highlight key instructions to aid in student success and retain attention. An abbreviated outline of instructions will be placed on the chalkboard for students to reference if procedures are unclear. Students requiring preferential seating will be granted a seat to aid in their comprehension during the teacher demonstration. Finally, students requiring extended time to complete assignments will be granted the extension outlined in their IEP.
Total Ag Program – **FFA** – This exercise would benefit students participating in the Livestock Evaluation, Dairy Evaluation or Horse Evaluation contest. Nutrition-based questions are included in the exams of these contests. **SAE** – Students with an interest in Small Animal Care, Dairy Production, Beef Production, Sheep Production, Swine Production, and Goat Production would benefit from this lesson. In order to be a successful livestock producer, an individual must have the knowledge of animal nutrition to properly feed their livestock projects and finish them to a desirable weight.

Lesson Summary

Which component(s) in your lesson plan are your "flex" item(s), i.e., can be lengthened or shortened to accommodate time? Explain how the component(s) can be "flexed".

The flex item of this lab is having students write the instructions on how to complete a Pearson Square. If students have a firm understanding of the topic prior to this class period, this portion of the lesson could be omitted.

Describe any adaptations and accommodations for learners with special needs that can be made in this lesson plan.

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requiring extended time to complete assignments will be granted the extension outlined in their IEP.

We learn in three modalities. Where in this lesson plan are your specific evidences of accommodating learners' modalities?

Visual-Students will see a demonstration from the instructor that describes the correct process to complete a Pearson Square. Additionally, students will write a list of the steps needed to complete a Pearson Square.

Auditory-Students will hear instructions given before they begin their experiment. In addition, students will be collaborating with their group members to increase their understanding of the purpose of the lab.

Kinesthetic-Students will measure the required amounts of M & Ms, Chex, and Pretzels to create the correct mixture according to Pearson Square calculations.

What is the highest level of cognition according to Bloom's Taxonomy that students reach in this lesson plan? Describe this occurrence.

The highest level of cognition reached is Creating. This occurs as students are calculating the final measurements for their ration and assembling the pieces to their Chex Mix.