

Putting Science into Animal Science Projects

Area: Keeping Production Records

Activity: Growth Charts and Average Daily Gain

Goal: To teach members about the recordkeeping of science information about the animal(s) they raise, and how that information can be applied to better manage the growth and health of the animal.

Materials Needed:

A copy of the growth records for the example named Rocky for each member

A copy of the blank growth chart for each member

How to do the activity:

This lesson is divided into four sections:

1. What can we measure? Discussion to prepare members to consider the procedures they will be fulfilling and the types of information they will be learning that can be measured.
2. Charting an Animal's Growth
3. What is Average Daily Gain?
4. Reaching a Target Weight

1. What can we measure?

The purpose of this discussion is simply to make members more aware of the many different pieces of information they can record as they raise animals, and to help them discover how they might use that information.

Ask the members to think about all the things they will be doing as they raise an animal. Their responses might include:

- Animal selection
- Purchasing feed
- Cleaning and maintaining the animal's living space
- Providing water
- Scheduling veterinary visits
- Administering medicines if animal becomes ill
- Breaking the animal to lead
- Training the animal for showing at fairs and shows
- Learning to bathe or groom the animal

Of all the responsibilities they identify, which of those can include some type of measurements? Some possible suggestions might include:

- Animal selection by comparing size of young animals
- Purchasing feed by measuring how much feed the animal consumes at different stages in its growth
- Maintaining the animal's living space by measuring the cleaning products bought and consumed, the bedding purchased
- Keeping records of how often the vet needs to visit, the expenses of those visits, the medicines that may be prescribed and their costs
- Measuring how much water an animal consumes.
- Listing the medicines that may need to be administered, the measurements of, and the methods and sites on the animal's body used for administering those drugs
- The time devoted to working with an animal to break it to lead
- The time and methods devoted to training an animal for show
- The tools and cleaning products needed to bathe or groom an animal

As records are maintained, ask the members to consider what records could be compared?

- Changes in feed and water consumption as the animal grows
- Information from the vet if multiple visits are required
- Size and weight of animal at different ages
- Success and challenges of using different types of leads when training the animals
- Different grooming products for effectiveness in cleaning the animal and for cost

Summary discussion: Your members will learn that they can keep track of lots of information as they raise their animals.

2. Charting an Animal's Growth

Putting information into charts is one way that members can compare changes in the animal's growth to not only document how fast it is growing, but also to compare to recommended growth rate charts, to determine if the animal is growing at a healthy rate.

The Ohio Beef Project and Record Book includes a Growth Chart that can be used for any member to learn to document growth. Members can then design a growth chart that's appropriate for the species of animal they are raising, or they can seek resources for growth charts that may be prepared by that industry.

Using the growth chart that's included in this lesson, explain to the members that the weight of the animal is recorded along the vertical axis of the chart, and the corresponding time of the growth, will be recorded as the dates along the horizontal axis of the chart.

Animal ID: Rocky, Tag No. 135								
Date	Weight (lb)	-	Previous weight	=	Total gain (lb)	÷	Days since last weight	= Actual ADG (lb per day)
1/1	600	-						
1/22	675	-	600	=	75	÷	21	3.6
2/12	710	-		=		÷		
3/5	775	-		=		÷		
3/26	820	-		=		÷		
4/16	880	-		=		÷		
5/7	930	-		=		÷		
5/28	980	-		=		÷		
6/18	1040	-		=		÷		
7/9	1090	-		=		÷		
7/30	1140	-		=		÷		
8/20	1190	-		=		÷		
9/10	1200	-		=		÷		
								*

Using the dates and weights provided, have the members chart the growth of this market steer.

3. What is Average Daily Gain (ADG)?

Monitoring the animal's weight gain over time is one way to determine that the animal is growing at an appropriate rate. Using the information provided in the growth records of the market steer, Rocky, above, help the members understand the mathematical process of calculating the Actual Average Daily Gain.

*Once all the Actual Daily Average Daily Gains have been determined, members need to determine the average of all the Actual ADG's to calculate the animals AVERAGE Daily Gain over its growth period. How to calculate: Add all the Actual ADG's determined. Then divide that number by the number of Actual ADG's used. In the example of Rocky, there will be 12 Actual ADGs added together, and then divided to determine Rocky's Average Daily Gain.

To strengthen this understanding, consider sharing other examples of other species of animals and their weight gain. This will help the members understand the concept.

4. Reaching a Target Weight

Based on industry standards, many 4-H livestock projects require that market animals, those being raised for human consumption, must be a specific size. This is usually described as a minimum weight

and a maximum weight, and animals eligible to be sold for human consumption must be between those minimum and maximum weights.

Knowing that target weight, members can calculate how much weight their animal needs to gain before going to market, and can then use their Average Daily Gain information to compare and contrast to determine if the animal is gaining adequately.

ROCKY, Market Steer

For Rocky, a market steer, the weight of the animal as a finished product must be at least 1200 pounds. If the animal is 600 pounds on January 1 when the member gets the animal, help the members determine how much weight the animal should gain to be at least 1200 pounds by September 10.

Answer: Rocky must gain at least 600 pounds. From January 1 to Sept 10 there are 252 days for growth, so dividing that 600 pounds to be gained by the 252 days for growth, would determine that Rocky would need to have an Average Daily Gain of about 2.4 pounds.

TANGO, Beef Feeder

Help the members work through a second example. For beef feeders, the recommended ending weight is 550 pounds. A 4-H member named Amanda is taking the beef feeder project and she gets her animal on February 20 and at that time, it weighs 80 pounds. The county fair is September 10 at which time Tango should ideally be about 550 pounds. What is the ideal Average Daily Gain for Tango?

Answer: Weight to be gained: 550 goal weight – 80 pounds on February 20 = 470 pounds to be gained. February 20 to Sept 10 is 202 days for growth, so dividing 470 pounds to be gained by 202 days for growth would determine that Tango would need to have an Average Daily Gain of 2.3 pounds.

Once the members understand the concept of the ideal average daily gain, then help them compare their animal's actual growth rate with its ideal growth rate. If the animal is gaining too slowly, help the member discover what they might do to help their animal gain weight more quickly. Likewise, if their animal is gaining too quickly, help them discover what they might do to slow their animal's growth rate.

How else might this kind of information be used to help members discover successful animal production? For the eager members, consider suggesting they study different feeds, and the nutritional difference within those feeds. With that information, and knowing their animal's tendency to gain weight either too quickly or too slowly, how might they manage the nutrition of their animal to keep focused on the Target Weight for that type of animal?

Conclusion

By completing this activity, 4-H members have been able to explore some concepts of science. They have asked questions, answered questions, gained some factual knowledge, and have hopefully been

encouraged to ask more questions. *How else might this ___? What if ___ were done? Why did I get these results?* As they expand their knowledge with Inquiry Based Learning, they are learning life skills that they will use again and again as capable adults.

References

Forquer, A., Kuber, P., and Wright, J. (Rev.Ed. 2011). *Beef Project and Record Book, Ohio 4-H Project 117*. The Ohio State University. Columbus, Ohio.

