Open Ended Inquiry: Student directed research

An alternative approach to the field trip for the experienced teacher:

Asking an answerable question

Students formulate research questions. With assistance, and supported by activities that help them explore different topics, students form a question that can be answered through direct observation and using the five senses.

Asking curriculum-based questions.

In advance of the field trip, students research any background information on the topic and/or the species/breed they have chosen.

Encourage questions that focus on core curriculum content in the Sciences such as: similarities and differences, animal needs, life cycles, and characteristics and behaviors: "What do they eat?" and "What do they do all day?". As a part of determining their topic, students benefit from having done previous class activities, discussion and brainstorming.

Consider assigning questions to teams so that several different topics are covered, and then teams can report on results upon their return to the classroom.

In upper elementary, the teacher can help students expand their knowledge base and broaden their questions from the specific topic of their breed or particular animal, to the broader context that includes consideration of life cycle, reproduction, heredity and environment of the farm.

Sample topics might include:

- Social order and communication
    - Is there a "pecking order"?
    - How do they interact with each other
        - bodily, proximity, pushing? eating nearby?
    - What messages do they seem to be telling one another?
    - Do they make noises? When?

- Research in advance, and then record what you see as the sequential steps of digestion and the roles of teeth and the mouth, esophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system. Take pictures or draw what you observe at the farm.

• Look for significant structures that assist in growth, survival and reproduction. Study the tails of the animals – what different functions do they serve? Domestic fowl and mammals reproduce sexually. What traits or characteristics help the offspring to survive? Remember, survival of offspring is an important step in successful reproduction!

• What features of the animals seem suited to the region where they live? What seems unsuited? Are there long-haired breeds in a hot climate or vise versa? Would another breed fare better here?

• Animals cause changes in the environment in which they live: some of these changes are detrimental to the organism or other organisms, and some are beneficial. Make notations of what you observe.

• What movements do they make? What purpose do these movements serve?

• What are the animals' basic needs and how are they basic met at this farm?

• What signs of health or illness do you see in the animals? What are indicators? Does the animal exhibit signs of good health? What are they? Do any animals look sick or unwell/ Why? Describe.

• How do the animals forage for or find food? Do they have to expend any energy finding food? Is there any danger involved? Are there a variety of food options? What sorts of decisions do they seem to be making in what they eat? How much do they eat each day? What do they eat? How many times per minute do they chew their cud? Is there a balancing of costs and benefits? How big are their manure pellets? (graph results of different species) and discuss consistency and content of herbivore scat. How many times per minute do they move their legs, take a bite or whatever other behavior you choose to observe? (Use the average of five or more different one-minute observation sets)

• Seek and describe a food chain, or possible food chain, that you see at the farm.

<u>Making Observations and recording results</u>

Go on the field trip. See real farm animals. Make specific observations, interview the animal caretaker, take notes, and record behaviors. They may need to plan ahead if they need to use instruments such as a timer

to record number of times something occurred in a set time limit – e.g. number of bites of grass per minute, or cud chews, or a ruler to measure dropping sizes. During the trip, students seek answers to the questions they formed, and upon returning to the classroom, write up their results. Review the circle of science.

As a part of the write up, include a discussion of what was expected versus what happened or was observed. What is different? What didn't you think about? What further questions do you have? Why was your question significant? How does your research contribute to what is known? Exchange results. Students share what they discovered.

Back in the classroom, research any questions that came up and form conclusions. Write up conclusions: what do you INFER based on the observations? Students submit research results in a final report.
Conclusions and Further Questions