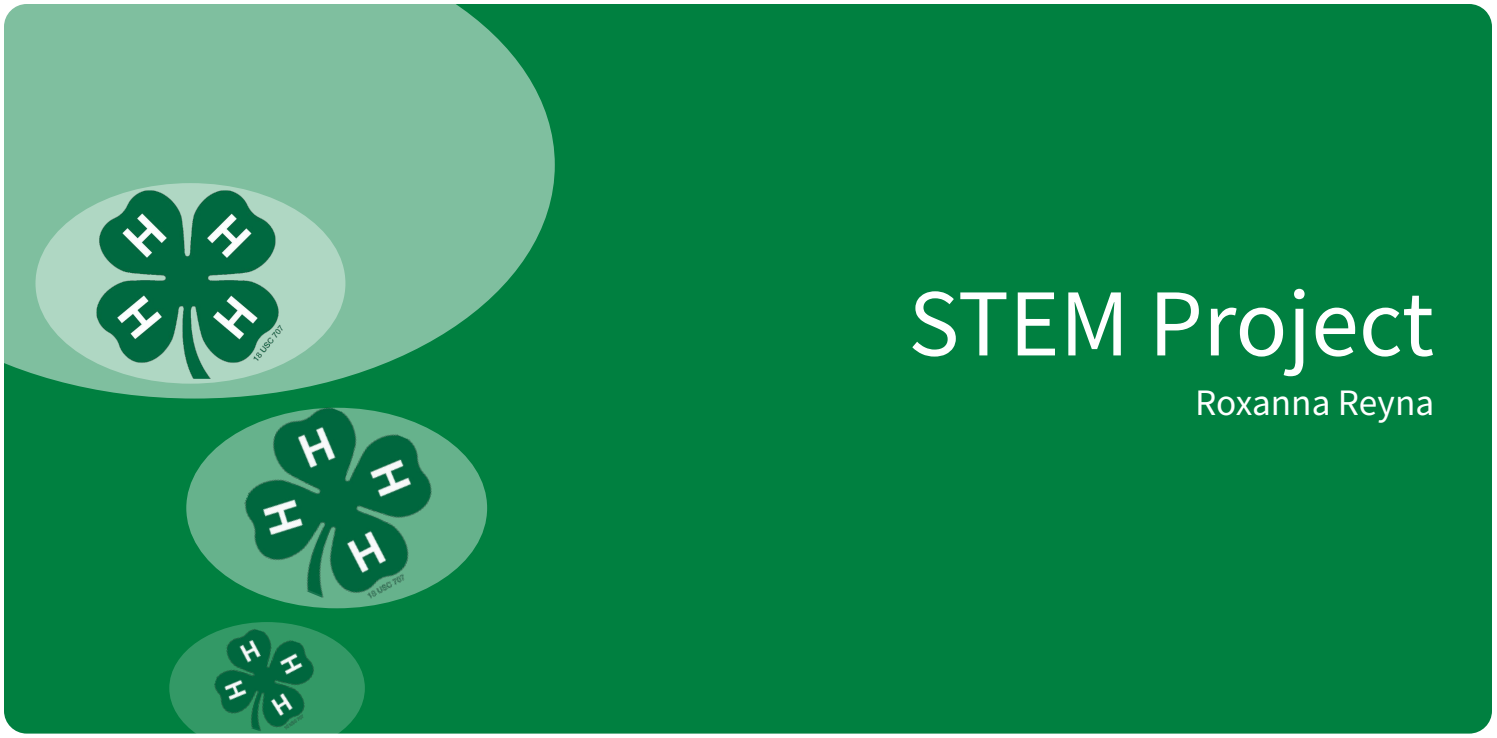
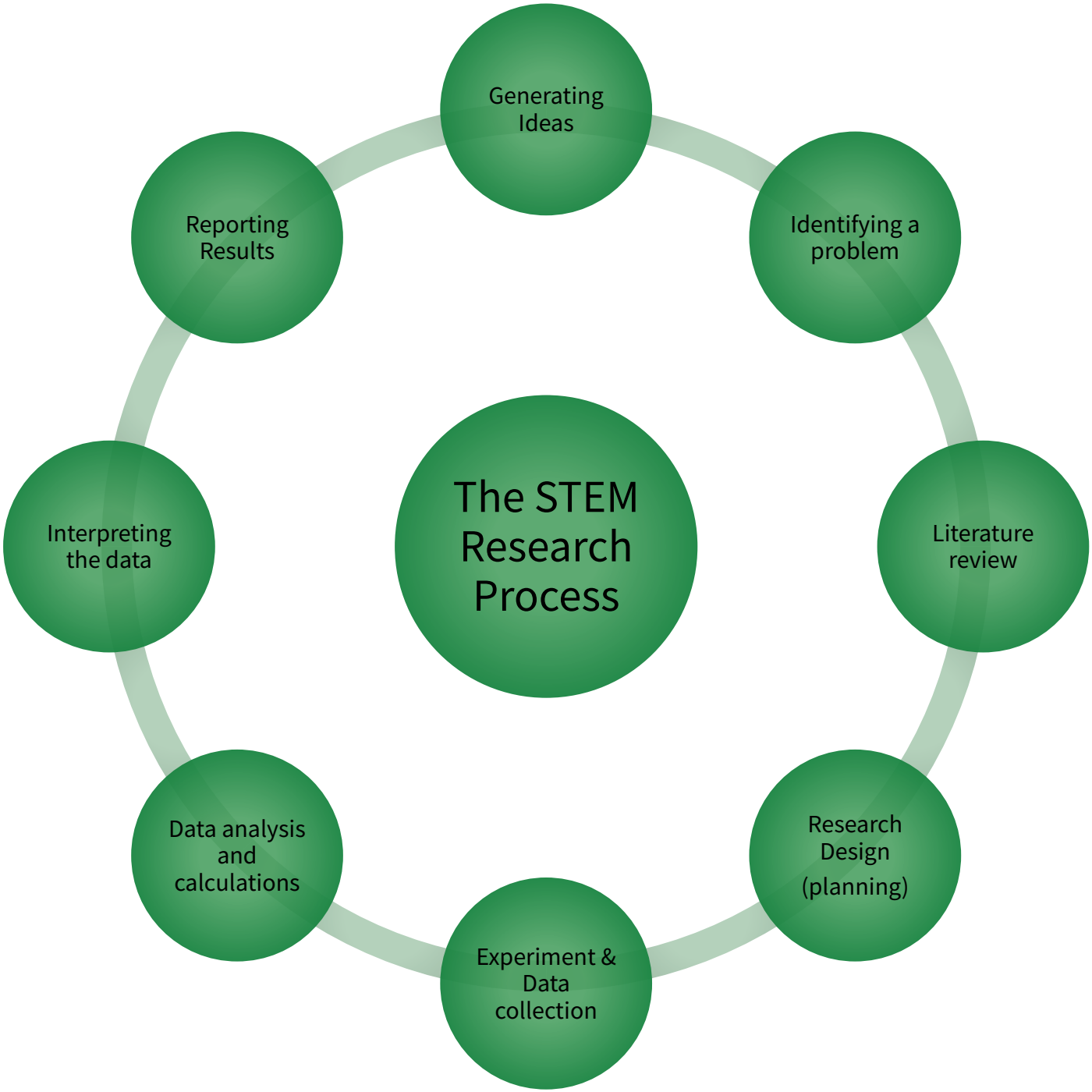


STEM Project

Roxanna Reyna


The STEM Research Process
Generating Ideas
Identifying a problem
Literature review
Research Design (planning)
Experiment & Data collection
Data analysis and calculations
Interpreting the data
Reporting Results

Generating Research Ideas

- Keep an idea journal
- Get out in the field
- Read science article and abstracts
  - https://apps2.societyforscience.org/abstracts/
- Visit web site
  - Science bodies
  - Government Agencies (NASA and U.S. biological survey)

Identifying a Problem

- Research Question
  - Should be very clear
  - Easy to turn into statement (hypothesis)
    - How does the dietary level of crude protein affects growth and feed intake of developing pullets?

Research Design (planning)

- Components
  - Entity
  - Independent Variable
  - Dependent Variable
  - Hypothesis
  - Constant

Entity

- Subject, specimen or item that is studied as part of the research project.

Independent & Dependent Variables

Independent Variable

- The variable in an experiment that is purposely changed or manipulated either in quantity or quality

Dependent Variable

- The variable in an experiment that can respond to the independent variable

Independent Variable	Possible Dependent Variable
Different brands of plant-based repellents	• Total number of insect bites • Size of insect bites • Color and/or itchiness of insect bites • Length of time
Soil sample from different depths	• Number of fossils (# per kg)
Soil types	• Soil pH • Soil coarseness • Soil K, P, N

Hypothesis

- There are three essential elements in a hypothesis
  - Independent Variable
  - Dependent Variable
  - A prediction of what kind of effect the independent variable will have in the dependent variable
- Phrases that propose differences
  - Increased/decreased
  - Higher/lower
  - More/less
  - Faster/slower

Hypothesis Formulas

- If____(IV)___ is related to ___ (DV)____, then (predict the effects).
- If the ____ (IV) is (describe the changes) then the ___ (DV) will (predict the effect).
- ___ the (DV) will (predict the effect) when ___ (IV) ___ describe the changes.

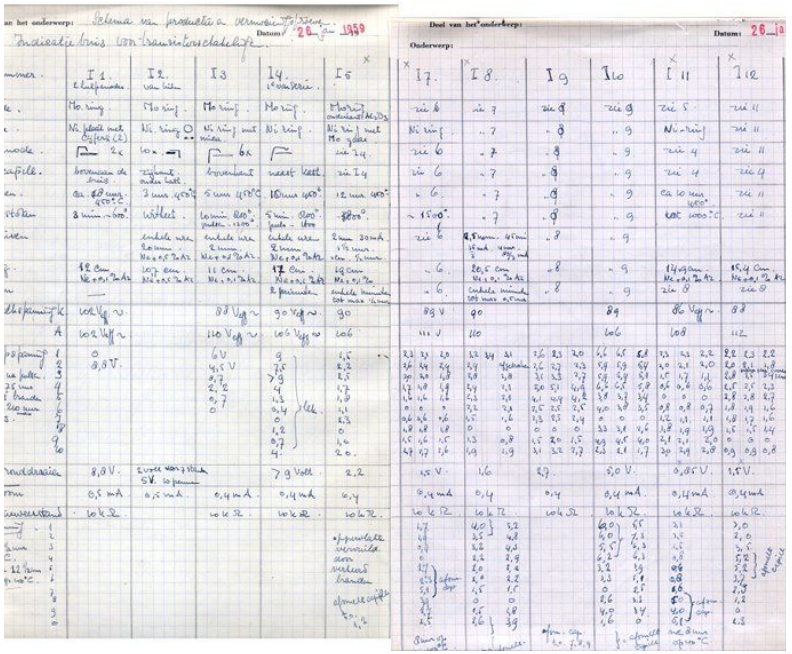
If the <u>temperature of a cricket's environment</u> is low then the <u>speed of cricket reproduction</u> will decrease.

Preparation to perform the experiment

- It is recommended to practice the data collection using all the equipment two or three days before the actual experimental period.
  - **Were all treatments groups properly label?**
  - If using scales, light bulbs, feeders, spray bottles, lighters, etc. **Do they work properly?**
- Also before the experiment it is important to know how is the data going to be collected
  - In tables
  - Using data keys

Logbook

It Should contain accurate and detailed notes of a well-planned, implemented project.



Quantitative or Qualitative Data

- Quantitative: Is based on quantities obtained using a quantifiable measurements process.
  - Examples: Length, height, area, volume, weight, speed, time, temperature humidity, sound levels, cost, members, ages, etc
- Qualitative: Records qualities that are descriptive, subjective or difficult to measure.
  - Examples: Softness of a cat, skin color, socio economic status, religious preference, etc.

Data Analysis and Calculations

- Percentages
- Arithmetic Men (Average)
- Standard Deviation
- Variance

Reporting Results

- Written Report
- Scientific Poster

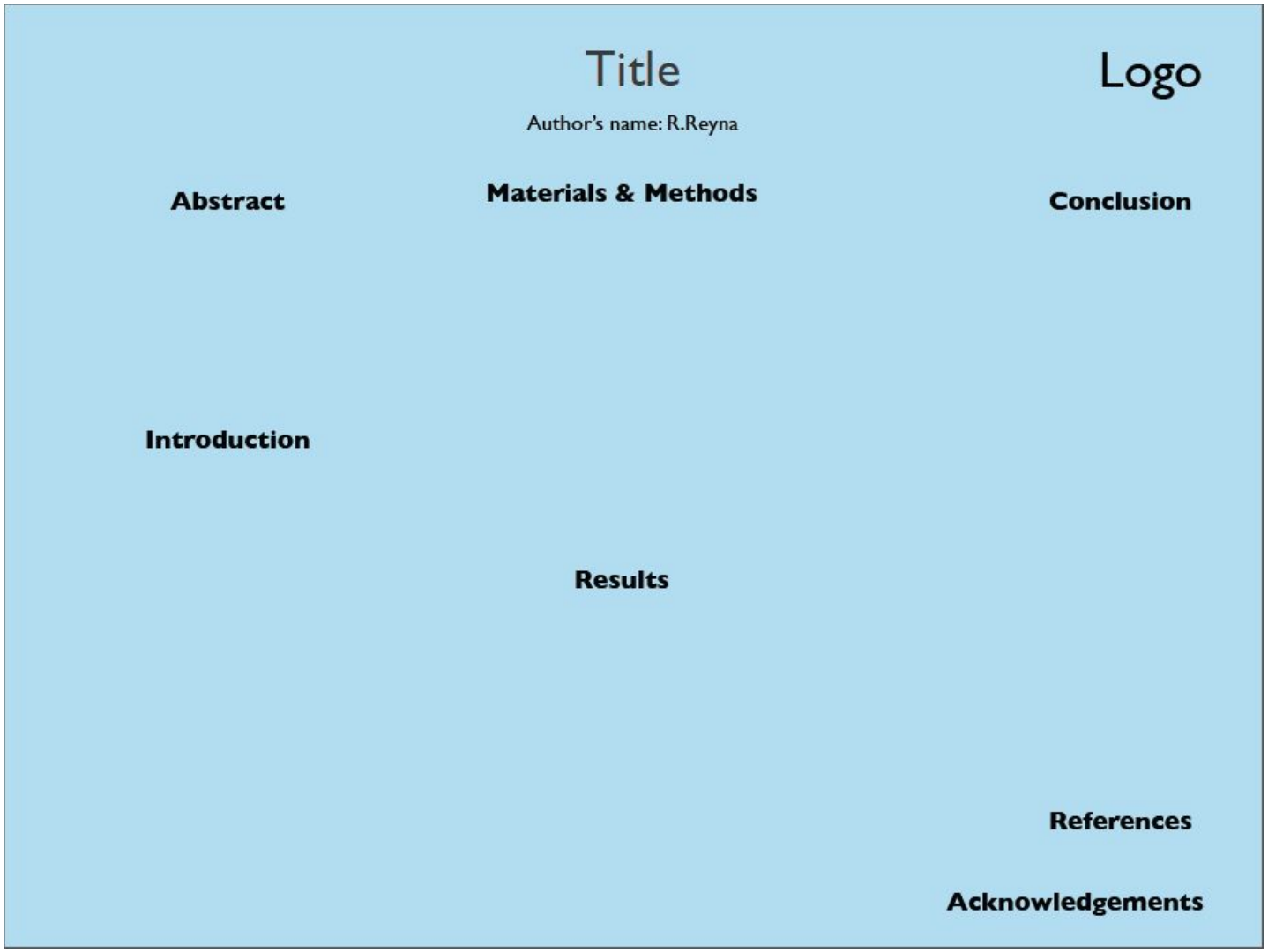
Written Report

- Components
  - Title
  - Introduction
  - Abstract
  - Literature Review
  - Materials and Methods
  - Results
  - Discussion and Conclusion
  - References or work cited
- https://www.ffa.org/SiteCollectionDocuments/agsci_handbook.pdf

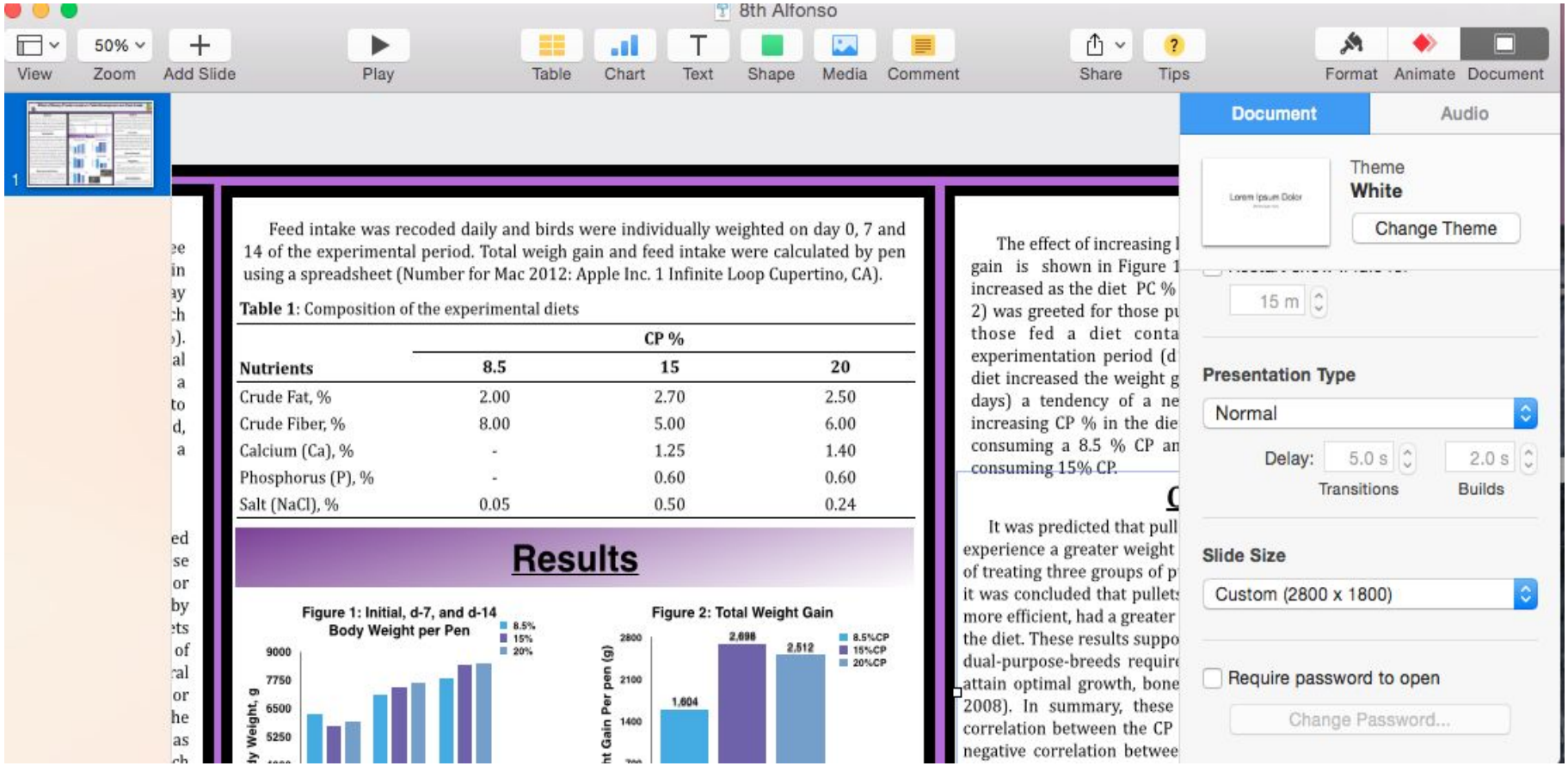
Poster Components

- Title
- Abstract
- Introduction
- Materials & Methods
- Results
- Conclusions
- Works cited or References
- Acknowledgments

Basic Components Order



Slide Size


8th Alfonso
View
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Share
Tips
Format
Animate
Document
Feed intake was recoded daily and birds were individually weighted on day 0, 7 and 14 of the experimental period. Total weigh gain and feed intake were calculated by pen using a spreadsheet (Number for Mac 2012: Apple Inc. 1 Infinite Loop Cupertino, CA).
Table 1: Composition of the experimental diets
CP %
Nutrients 8.5 15 20
Crude Fat, % 2.00 2.70 2.50
Crude Fiber, % 8.00 5.00 6.00
Calcium (Ca), % - 1.25 1.40
Phosphorus (P), % - 0.60 0.60
Salt (NaCl), % 0.05 0.50 0.24
Results
Figure 1: Initial, d-7, and d-14 Body Weight per Pen
8.5%
15%
20%
9000
7750
6500
5250
Figure 2: Total Weight Gain
8.5%CP
15%CP
20%CP
2800
2100
1400
1,604
2,698
2,512
The effect of increasing
gain is shown in Figure 1
increased as the diet PC %
2) was greeted for those pu
those fed a diet conta
experimentation period (d
diet increased the weight g
days) a tendency of a ne
increasing CP % in the die
consuming a 8.5 % CP an
consuming 15% CP.
It was predicted that pull
experience a greater weight
of treating three groups of p
it was concluded that pullets
more efficient, had a greater
the diet. These results suppo
dual-purpose-breeds require
attain optimal growth, bone
2008). In summary, these
correlation between the CP
negative correlation betwee
Document
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Theme
White
Change Theme
15 m
Presentation Type
Normal
Delay:
5.0 s
2.0 s
Transitions
Builds
Slide Size
Custom (2800 x 1800)
Require password to open
Change Password...

Logo

Title of the Research Study

PEOPLE WHO DID THE STUDY

UNIVERSITIES AND/OR HOSPITALS THEY ARE AFFILIATED WITH

Logo

Introduction

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We've put in the headings we usually see in these posters, you can copy and paste and change to your hearts content! We suggest you use keep black text against a light background so that it is easy to read. Background color can be changed in format-background-drop down menu.

The boxes around the text will automatically fit the text you type, and if you click on the text, you can use the little handles that appear to stretch or squeeze the text boxes to whatever size you want. If you need just a little more room for your type, go to format-line spacing and reduce it to 90 or even 85%.

The dotted lines through the center of the piece will not print, they are for alignment. You can move them around by clicking and holding them, and a little box will tell you where they are on the page. Use them to get your pictures or text boxes aligned together.

How to bring things in from Excel® and Word®

Excel- select the chart, hit edit-copy, and then edit-paste into PowerPoint®. The chart can then be stretched to fit as required. If you need to edit parts of the chart, it can be ungrouped. ***Watch out*** for scientific symbols used in imported charts, which PowerPoint will not recognize as a used font and may print improperly if we don't have the font installed on our system. It is best to use the Symbol font for scientific characters.

Word- select the text to be brought into PowerPoint, hit edit-copy, then edit-paste the text into a new or existing text block. This text is editable. You can change the size, color, etc. in format-text. We suggest you not put shadows on smaller text. Stick with Arial and Times New Roman fonts so your collaborators will have them.

Scans

We need images to be 72 to 100 dpi in their final size, or use a rule of thumb of 2 to 4 megabytes of uncompressed .tif file per square foot of image. For instance, a 3x5 photo that will be 6x10 in size on the final poster should be scanned at 200 dpi.

We prefer that you import tif or jpg images into PowerPoint. Generally, if you double click on an image to open it in Microsoft Photo Editor, and it tells you the image is too large, then it is too large for PowerPoint to handle too. We find that images 1200x1600 pixels or smaller work very well. Very large images may show on your screen but PowerPoint cannot print them.

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Methods

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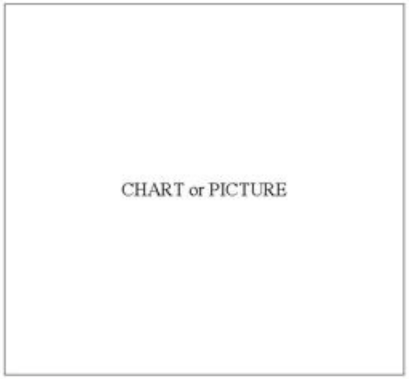
Figure #1



Results

Xxx

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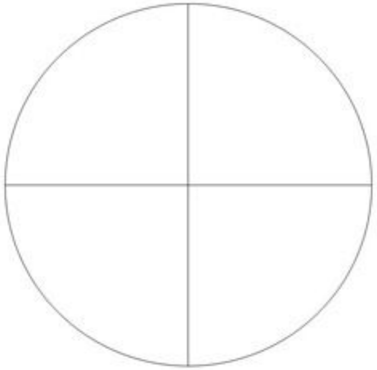
Figure #2



Conclusions

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Bibliography

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Logo

Title of the Research Study

PEOPLE WHO DID THE STUDY

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Logo

Introduction

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Feedback: If you have comments about how this template worked for you, email to sales@megaprint.com.

We listen! Call us at 800-590-7850 if we can help in any way.

Methods

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Results

Figure #1

CHART or PICTURE

Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Conclusions

Xxxx

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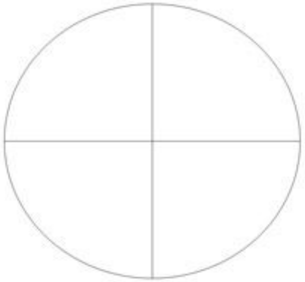
Figure #2



Bibliography

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The Effects of Using Alternate Sources of Calcium and Phosphorus in Place of Dicalcium Phosphate and Limestone

Leslie Linderleaf, Joshua Koontz, Melissa Elischer, and Kristen Brodt
ANSC 324 - 9:30am Laboratory Group 4

Abstract

A two-week study was designed to test the growth and performance of broiler chicks fed a corn-soybean meal (C-SBM) based control diet with dicalcium phosphate (DCP) and limestone compared to chicks fed diets in which Ca and P were supplied with meat and bone meal (MBM), fish meal (FM), and alfalfa meal (AM). Thirty broiler chicks were randomly allocated to three diets with two replicate cages per diet (5 birds/cage). The three diets were formulated to contain ingredients that would meet or exceed the Ca and P requirements of 0-3 wk old chicks. The control diet was a C-SBM based diet with DCP and limestone. Dicalcium phosphate and limestone were replaced with MBM to meet or exceed Ca and P requirements in diet 2, and the third diet used a combination of MBM, FM, and AM to replace DCP and limestone. On d 1 and at the end of every week, pen body weight (BW) and feed intake were recorded. Average daily gain (ADG), average daily feed intake (ADFI), and feed to gain ratio (F:G) were calculated for each week. No significant difference was seen in ADG, ADFI, and F:G in chicks fed diets containing alternate Ca and P sources.

Introduction

Calcium and phosphorus are required in poultry diets to sustain growth rates and for skeletal integrity. However, sources of Ca and P vary depending on the geographic location's resources. The poultry and swine industries are predominant consumers of meat and bone meal because of its high calcium, available phosphorus, and lysine content (Miles and Jacob, 2007). According to the Institute of Poultry Research, meat and bone meal can be successfully used in broiler diets with concentrations reaching 10% of the diet, (Bozkurt, et al., 2004). Our hypothesis was that similar growth and performance to chicks fed a corn-SBM based control diet with DCP and limestone can be obtained by adding meat and bone meal, fish meal, and alfalfa meal to meet the Ca and P requirements in place of DCP and limestone. To test our hypothesis, thirty, male, broiler chicks were fed three different diets: a control diet with DCP and limestone, a diet containing meat and bone meal in place of DCP and limestone, and a diet with meat and bone meal, fish meal, and alfalfa meal to replace DCP and limestone.

Materials and Methods

- 30 male broilers obtained on day of hatch
- Fed an adjustment diet for 1 day
- Randomly allotted to Petersime battery cages with nipple waterers and trough feeders
- Housed at 5 birds/pen at 2 pens/diet
- Allowed ad libitum access to feed and water
- All diets were corn-SBM based and were formulated to meet or exceed all nutrient requirements (NRC 1994)
- Diets were (Table 1):
  1. Corn-SBM control with DCP and limestone
  2. Corn-SBM based with meat and bone meal
  3. Corn-SBM based with meat and bone meal, fish meal, and alfalfa meal
- Chicks were checked daily
- Pen body weight (BW) and feed intake recorded weekly
- Mortality and morbidity recorded daily
- Average daily gain, average daily feed intake, and gain to feed ratios calculated each week
- T-tests performed on ADG, ADFI, and G:F
- Level of significance was set at P<0.1

Ingredients, %	Diet 1	Diet 2	Diet 3
Corn	50.10	57.09	48.17
SBM, 47.5% CP	38.14	26.67	19.29
Soybean oil	6.53	4.78	7.93
Meat & Bone Meal	0.00	9.72	2.94
Fish Meal	0.00	0.00	10.00
Alfalfa Meal	0.00	0.00	10.00
Dicalcium Phosphate	1.96	0.00	0.00
Limestone	1.37	0.00	0.00
Salt	0.48	0.31	0.31
D,L-Methionine	0.16	0.19	0.11
Poultry Vit/TM premix*	0.25	0.25	0.25
Calculated Composition			
CP, %	23.00	23.00	23.00
Lys, %	1.32	1.26	1.26
ME, Kcal/kg	1455	1455	1455
Ca, %	1.00	1.00	1.00
P, %	0.45	0.48	0.48

* Poultry Vit/TM premix includes Zinc at 60mg/kg, Manganese at 60mg/kg, Vitamin D at 200 ICU/kg, and Vitamin E 10 IU/kg

Results

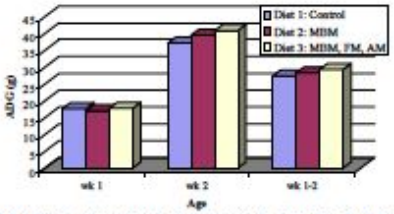


Figure 1. Effects of alternate sources of Ca and P on average daily gain in 0-2 wk old broilers. There were no effects (P>0.10) of diet on ADG.

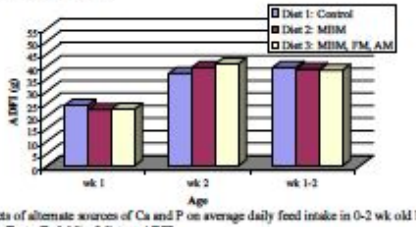


Figure 2. Effects of alternate sources of Ca and P on average daily feed intake in 0-2 wk old broilers. There were no effects (P>0.10) of diet on ADFI.

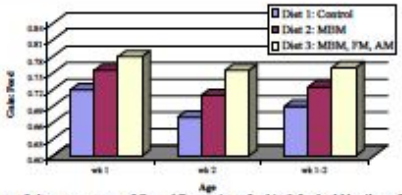


Figure 3. Effects of alternate sources of Ca and P on gain to feed in 0-2 wk old broilers. There were no effect (P>0.10) of diet on G:F.

Discussion

This two-week experiment indicates that alternative sources of Ca and P (such as meat and bone meal, fish meal, and alfalfa) were effective in meeting the Ca and P requirements of broiler chicks. Our results are supported by the findings of Bozkurt, et al. (2004), who used MBM as the source of Ca and P for turkeys for their experiment. Bozkurt, et al. (2004) also reported that high levels of MBM in the diet resulted in a slight increase (P>0.05) in ADG, compared to the birds fed the control diet. This same phenomenon was observed in our results, but was not significant.

The percent of MBM included in the diet was kept under 10%, which seems to offer the greatest benefits to the chicks. Experiments with up to 40% MBM have been conducted, but the accepted inclusion rates generally fall between 2-7%, with 10% as the upper limit ((Miles and Jacob, 2007). Although no change in ADG, ADFI, or F:G were observed, the alternate sources of Ca and P may offer other benefits from additional nutrients, such as vitamin B12, amino acids, zinc, and iron found in meat and bone meal. Though specific research on the affects of fish meal and alfalfa were not obtained, we feel that these two ingredients made positive contributions to the diet because. Both of these feeds offer other important nutrients, such as high levels of niacin, amino acids, and selenium in fish meal, and high concentrations of bioavailable P, beta-carotene, vitamin E, and pantothenic acid in alfalfa.

Implications

- The results from this experiment did not show any significant difference in the ADG, ADFI, or F:G in the birds on the three diets, but we feel that the alternate sources may be beneficial because they provide other nutrients for the animals.
- These alternatives are may be less costly for some producers, thus there could be an economic advantage to using these different ingredients (Bozkurt et al., 2004).
- Due to high levels of Ca and P in these alternate sources, there is a limit to the inclusion level in the diet to avoid environmental problems from excess excretion of these nutrients.

References

Bozkurt, M, H Basmacioglu, and M Ergul. "Effect of Dietary Concentration Meat and Bone Meal on Broiler Chickens Performance." International Journal of Poultry Science 11 (2004): 719-723. 3 Apr. 2007.

Miles, R. D., and J. P. Jacob. "Using Meat and Bone Meal in Poultry Diets." IFAS Extension. University of Florida. 3 Apr. 2007 <http://edis.ifas.ufl.edu/PS024>.

Nutrient Requirements of Poultry. The National Academy of Sciences. National Academies, 2004. 27.

The Effect of Crude Protein Intake on Poultry Average Daily Gain

Daphne Ardizzone, Cody Gerber, Stephanie Hucko, Kedrick Miller, and Jamie Pozezinski
ANSC 324 Group 2 9:30 A.M.

Abstract

This study was conducted to determine if decreasing dietary crude protein (CP) would decrease average daily gain (ADG) in broilers. Three different types of diets each having a different amount of CP were fed to two replicate cages of five chicks per cage from day 1 to day 14. Chicks were weighed every seven days for two weeks. The CP levels for diets 1 (control), 2, and 3 were 23.0, 20.5, and 19.1 %, respectively. The control diet was formulated to meet NRC (1994) requirements for CP and the other diets were formulated to meet minimum NRC requirements for amino acids with the addition of synthetic amino acids. Data were analyzed using t-tests for equal variance. The result from our experiment indicated that between day 1 and day 14 decreasing CP with the supplementation of synthetic amino acids from 23.0 to 19.1 % does not affect broiler ADG.

Introduction

The most recent NRC (1994) lists the crude protein (CP) requirement of 0-3 week old broilers as 23%. Previous experiments have reported that decreasing dietary CP resulted in a decrease in average daily gain (ADG) (Bregendahl 2002). In addition to this, Bregendahl et al. (2004) reported a decreased feed efficiency and growth rate when low protein diets were fed to broilers. To replace the loss of CP and still maintain growth, synthetic amino acids can be used to meet the requirements for the limiting amino acids. Jiang et al. (2005) demonstrated that diets low in CP can be supplemented with synthetic amino acids to maintain performance. The NRC (1994) recommendations for CP are based on the amount of CP that needs to be in the diet to meet the requirements of essential amino acids present in the diet. This is done, assuming that no synthetic amino acids are supplemented to the diet and all amino acid sources are from typical ingredients that are fed to poultry commercially. It was observed that adding the synthetic amino acid glycine to diets low in CP prevented decreases in body weight due to a deficiency of glycine (Waldroup et al., 2005). Our hypothesis was that by decreasing dietary CP with supplementation of synthetic amino acids, ADG would be reduced. To test our hypothesis, we used 30 male broilers obtained on the day of hatch in a 14 day experiment to determine whether ADG and average daily feed intake (ADFI) would be affected by decreases in dietary CP.

Materials and Methods

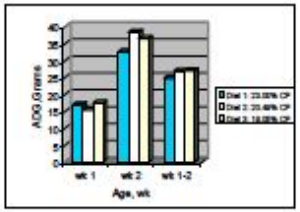
Thirty, day-old, male, broilers were randomly allocated to 6 cages with 2 cages per diet and 5 birds per cage. Birds were placed in Petersime battery cages with nipple waterers, trough feeders, and surface tension waterers. Pen body weight and feed intake were recorded on the first day and at the end of the first and second week. Birds had unlimited access to feed and water. Diets 1, 2, and 3, were formulated to contain 23.0, 20.5, and 19.1% CP, respectively. These values and ingredients were chosen to determine whether the amount of CP in a diet would affect growth rate. T-tests were used to determine the effects of the diet on ADG, ADFI, and gain to feed (G:F) ratio. Significance was determined by Ps0.1. Each pen served as the experimental unit.

Ingredient %	Control	Treatment 1	Treatment 2
Corn	41.58	50.82	56.23
Soybean Meal; 44%	43.76	36.13	31.51
Fat, Soy Oil	10.58	8.80	7.81
Dical. Phosphate	1.74	1.82	1.81
Limeston	1.42	1.43	1.44
Vit. Premix	0.25	0.25	0.25
Total	100.00	100.00	100.00
Calculated Composition			
CP %	23.00	20.49	19.05
Lys %	1.38	1.10	1.09
ME Kcal/kg	1445.00	1455.00	1455.00
Ca %	0.94	0.94	0.94
P %	0.73	0.72	0.71

Results

Dietary CP level showed no significant effect on the performance of broiler chicks. Despite the difference in percent of CP within our three diets, we observed no considerable change in ADG, ADFI, or G:F in chickens 0 to 2 weeks of age. Throughout the experiment and between the three diets, the ADG was between 49.6 to 54.1 grams/day (figure 1). ADFI ranged between 90.1 to 104.2 grams/day (figure 2) and G:F ratio ranged between 1.0 to 1.1 grams/day (figure 3). The range between the diets is too small to show significant data according to the T-tests performed; p-values were all greater than 0.10. Figure 1 and 2 illustrates consistency of the ADG and ADFI between diets. However, the ADG and ADFI increased numerically between weeks 1 and 2, regardless of the diet. While the ADG and ADFI increased with age, the G:F ratio is decreased, as seen in Figure 3.

Figure 1. The Effect of Dietary Crude Protein on Average Daily Gain. There was no significance in the data Ps0.1.



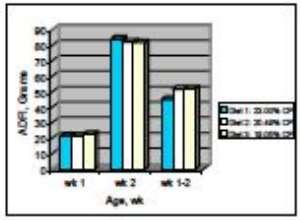
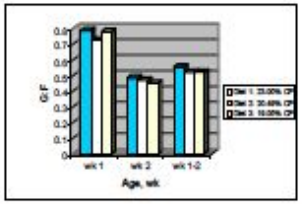


Figure 2. The Effect of Dietary Crude Protein on Average Daily Feed Intake. There was no significance in data Ps0.1.

Figure 3. The Effect of Dietary Crude Protein on a Gain:Feed Ratio. There was no significance in data Ps0.1.



Discussion

Based on the results of this experiment we reject the hypothesis that a decrease in dietary CP will cause a decrease in ADG. In contrast, Waldroup et al. (2005) reported that decreasing CP levels below 22% significantly decreased BW gain and increased the feed conversion ratio (FCR). In this same experiment, Waldroup et al. (2005) determined that supplementation with synthetic amino acids partially improved the loss in body weight gain. Our experiment shows similar data, when supplementation with synthetic amino acids in present there is no decrease in ADG. In order to achieve our hypothesis, a diet should have only consisted of a decrease in dietary CP without the addition of synthetic amino acids. Other research that supports our hypotheses shows that by decreasing CP and supplementing with essential amino acids body weight gain is negatively affected (Pinchasov, 1990). The difference between our results and the results of other research experiments could be due to the time length of the experiment. Other experiments ran for 21 days or more, whereas our research only lasted for 14 days. Even though our results and data do not prove our hypothesis correct, plenty of other experiments, such as Pinchasov (1990) and Waldroup et al. (2005), have been performed and successfully provide evidence supporting our hypothesis. Another reason that our results could have conflicted with our hypothesis and other experiments is due to experimental errors such as feed wastage, or problems in weighing the chickens as they became larger and more active.

Implications

This experiment determined that by decreasing CP with the supplementation of synthetic amino acids there is no decrease in average daily gain, feed efficiency, or growth:feed ratio. Supplementing diets with synthetic amino acids can decrease the dependency that producers have on high protein feed ingredients such as soybean meal. With corn prices continuing to increase and more corn producers breaking the crop rotation of corn/soybean meal, the economical value of using soybean meal should decline. Synthetic amino acids can be used to combat the increasing prices, without any negative affects on the growing broilers.

References

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• Pinchasov Y, Mendonca CX, Jensen LS. (1990). "Broiler chick response to low protein diets supplemented with synthetic amino acids." *Poultry Science*. Nov;69(11):1950-5.
• Bregendahl, K., J.L. Sell and D.R. Zimmerman. "The effect of low-protein diets on growth performance and body composition of broiler chicks". *Poultry Science*. 81:1156-1167. 2002.
• Jiang, Q., P.W. Waldroup and C.A. Fritts. "Improving the Utilization of Diets Low in Crude Protein for Broiler Chicken 1. Evaluation of Special Amino Acid Supplementation to Diets Low in Crude Protein". *International Journal of Poultry Science*. 4 (3):115-122. 2005.
• Waldroup, P.W., Q. Jiang and C.A. Fritts. "Effects of Glycine and Threonine Supplementation on Performance of Broiler Chicks Fed Diets Low in Crude Protein". *International Journal of Poultry Science*. 4 (5):250-257. 2005.

Effect of Dietary Protein Levels on Pullet Development and Feed Intake

Abstract

The objective of this investigation was to compare the effect of three locally available feed brands containing different levels of crude protein (CP) on weigh gain and feed intake of 6-week-old pullets. Over a 14 day period, three groups of pullets (n = 10) were fed different diets, each containing different percentages of crude protein (8.5%, 15%, and 20%). Each group of pullets was weighed on day 1, 7 and 14 of the experimental period, in order to estimate total weight gain. Pullets feed 8.5% CP had a higher feed intake and lower weigh gain, which resulted in a higher feed to gain ratio when compered to those fed 15 and 20% CP. On the other hand, pullets fed 15% CP had a greater efficiency, a higher weight gain, and a lower feed intake than those feed 8.5% and 20% CP.

Introduction

For many local small-scale producers, a common practice is to feed growing pullets locally available commercially formulated feeds. These diets are typically formulated with different levels of CP. These diets may or may not meet the nutritional requirements listed for developing pullets by the NRC affecting the development and weight gain of growing pullets during a critical period of rapid growth, such as the six to twelve weeks of age (NRC, 1994). Since pullets attain most of their adult structural components (muscle, bone, and feathers) from 6 to 12 weeks of age, poor growth during this period will prevent the pullets from obtaining the proper body reserves and organ functions to sustain high production as adult layers (Canton and Johnson, 1995). Most dual-purpose breeds, such as Black Austrolorop, Dark Cornish, Golden Wyandotte, Barred Rock, and Production Red are ready-to-lay at 18 to 21 weeks of age (or at 5.9 to 6.8 kg of body weight) with an estimated feed intake of 98 to 107 g/day when consuming a feed containing from 16 to 19% CP (Frame, 2008). However, the most common feeds available for developing small flocks of pullets in the Nolan County area include Scratch Grains (8.5% CP), Dumor Grower (15% CP), and Dumor Starter (20% CP). These feeds may exceed or fall short of meeting the protein requirements of a 6-week-old pullet (16 to 19% CP), which may adversely affect pullets' feed intake and weight gain. This may reduce the chance of the pullet to perform to its maximum genetic potential as layer (Hussein, 1996). Therefore, it is important to investigate the effect of these three locally available feeds (containing different levels of CP) on feed intake and weight gain of six-week-old growing pullets.

Materials and Methods

Thirty, 6-weeks-old pullets (5 different breeds) were randomly allocated into three 4x4ft indoor metal pens (n =10). The individual pen floors were covered with clean pine shavings for litter. Each pen was equipped with one feeder and one drinker (3.G) and a heating lamp. Each pen of birds was feed a different commercially formulated locally available feed (ad-libitum) for 14-days. Diets were formulated with different elves of CP (8.5%, 15%, and 20%). Compositions of the experimental diets are shown on Table 1.

Feed intake was recoded daily and birds were individually weighted on day 0, 7 and 14 of the experimental period. Total weigh gain and feed intake were calculated by pen using a spreadsheet (Number for Mac 2012: Apple Inc. 1 Infinite Loop Cupertino, CA).

Table 1: Composition of the experimental diets

	CP %		
Nutrients	**8.5**	**15**	**20**
Crude Fat, %	2.00	2.70	2.50
Crude Fiber, %	8.00	5.00	6.00
Calcium (Ca), %	-	1.25	1.40
Phosphorus (P), %	-	0.60	0.60
Salt (NaCl), %	0.05	0.50	0.24

Results

Figure 1: Initial, d-7, and d-14 Body Weight per Pen

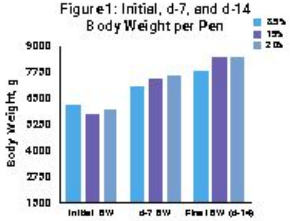


Figure 2: Total Weight Gain

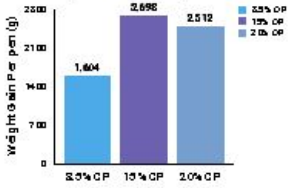


Figure 3: Total Feed Intake

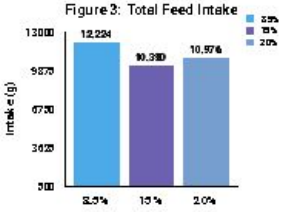


Figure 4: Feed Efficiency (Feed to Gain Ratio)

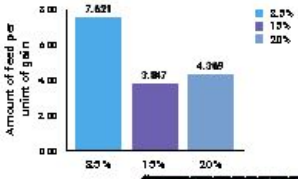


Figure 4: Total Amount Fed

Results

The effect of increasing levels of CP protein percentage on body weight gain is shown in Figure 1. It was observed that body weight tended to increased as the diet PC% increased. Total weight gain (shown in Figure. 2) was greeted for those pullets consuming a 15% CP diet and lower for those fed a diet containing 8.5% CP. Considering the entire experimentation period (d1-d14), increasing the protein content of the diet increased the weight gain of 6-week-old pullets. Figure 3 shows (14 days) a tendency of a negative correlation between feed intake and increasing CP % in the diet, with the highest intake observed in pullets consuming a 8.5 % CP and the lowest feed intake observed in those consuming 15% CP.

Conclusion

It was predicted that pullets being fed a diet containing 15% CP would experience a greater weight gain requiring less feed intake. After 14 days of treating three groups of pullets with 8.5, 15, and 20% CP in their diets, it was concluded that pullets fed diets 15% CP consumed less feed, were more efficient, had a greater weight gain than those fed c8.5 or 20% CP in the diet. These results supported previous research results indicating that dual-purpose-breeds required between 16 and 19% CP in their diet to attain optimal growth, bone, muscle, and feathers development (Frame, 2008). In summary, these results indicated that there is a positive correlation between the CP % in the diet and pullets' weight gain and a negative correlation between CP % in the diet and feed intake, when feeding diets between 8.5 and 20% CP to 6-weeks- old growing pullets.

Future Research

For future experiments, we plan on having a longer experimental period, a greater number of entities, and a larger number of experimental groups for more reliable results.

References

Cantor, H. A., Pescatore, J. A., & Johnson, H. T. (1996). Effect of dietary protein and energy levels on pullet development. *Poultry Science, 75, 973-978.*

Cantor, A. H., and T. H. Johnson, 1985. Influence of dietary protein sequence and selenium upon development of pullets. *Poultry Science*. 64, 75.

Frame, D. D. (2008). *Principles of feeding small flocks of chickens at home*. Logan Utah, Utah State University, Cooperative Extension.

National Research Council, 1994. Nutrient Requirements of Poultry. 9th rev. ed. *National Academy Press, Washington, DC.*

Acknowledgments

This project would not have been possible without the Roscoe Collegiate Board of Trustees, and the Roscoe ISD faculty. I would like to give a special thanks to AgriLife Extension Program and the Roscoe FFA for funding this project.

Title

- Should be descriptive
- Written in scientific style
- Non in a form of a question
- Independent and Dependent Variable must be included
- Use scientific names
- Use Title Case

NO	YES
Do Radish Seeds Prefer Acid or Base?	Effect of pH on *Raphanus sativus* Seed Germination
Cloudy with a Chance of Bean Plant	Effect of Light and Water Stress on *Phaseolus vulgaris* Growth

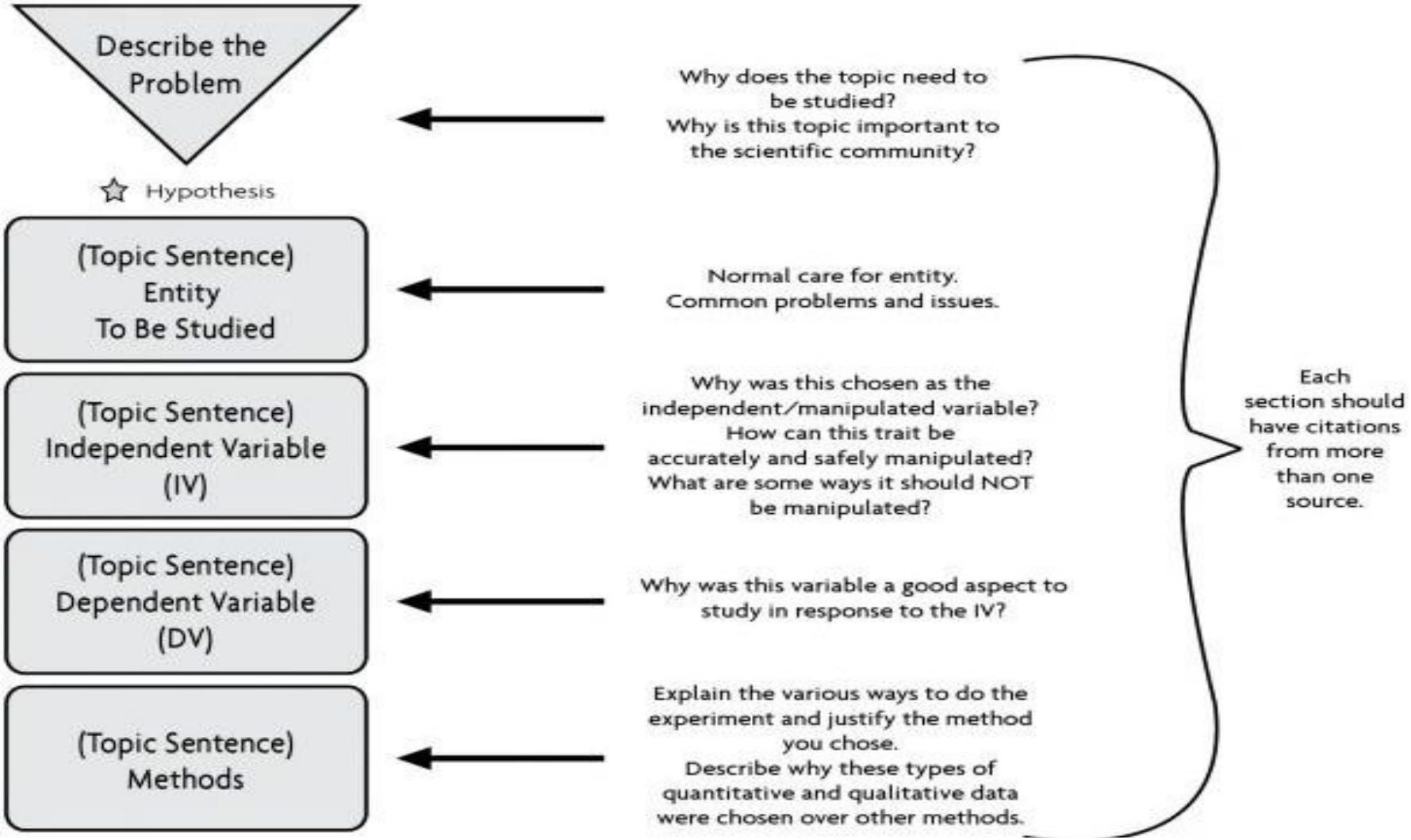
Abstract

- It is a paragraph that briefly describes the experiment
  - Purpose of the experiment
  - Procedure used
  - Observation/Data/Results
  - Conclusions

The objective of this investigation was to compare the effect of three locally available feed brands containing different levels of crude protein (**CP**) on weigh gain and feed intake of 6-week-old pullets. Over a 14 day period, three groups of pullets (*n* = 10) were fed different diets, each containing different percentages of crude protein (8.5%, 15%, and 20%). Each group of pullets was weighted on day 1, 7 and 14 of the experimental period, in order to estimate total weight gain. Pullets feed 8.5% CP had a higher feed intake and lower weigh gain, which resulted in a higher feed to gain ratio when compered to those fed 15 and 20% CP. On the other hand, pullets fed 15% CP had a greater efficiency, a higher weight gain, and a lower feed intake than those feed 8.5% and 20% CP. In summery, pullets fed 15% CP consumed less feed, were more efficient, had a greater weight gain than those fed c 8.5 or 20% CP in the diet.

Introduction

Paragraph Organization for Introduction of a STEM Research Paper



Introduction

For many local small-scale producers, a common practice is to feed growing pullets locally available commercially formulated feeds. These diets are typically formulated with different levels of CP. These diets may or may not meet the nutritional requirements listed for developing pullets by the NRC affecting the development and weight gain of growing pullets during a critical period of rapid growth, such as the six to twelve weeks of age (NRC, 1994). Since pullets attain most of their adult structural components (muscle, bone, and feathers) from 6 to 12 weeks of age, poor growth during this period will prevent the pullets from obtaining the proper body reserves and organ functions to sustain high production as adult layers (Canton and Johnson, 1995). Most dual-purpose breeds, such as Black Austrolorop, Dark Cornish, Golden Wyandotte, Barred Rock, and Production Red are ready-to-lay at 18 to 21 weeks of age (or at 5.9 to 6.8 kg of body weight) with an estimated feed intake of 98 to 107 g/day when consuming a feed containing from 16 to 19% CP (Frame, 2008). However, the most common feeds available for developing small flocks of pullets in the Nolan County area include Scratch Grains (8.5% CP), Dumor Grower (15% CP), and Dumor Starter (20% CP). These feeds may exceed or fall short of meeting the protein requirements of a 6-week-old pullet (16 to 19% CP), which may adversely affect pullets' feed intake and weight gain. This may reduce

Problem

Entity

Independent Variable

Hypothesis

Dependent Variable

Objective

Materials and Methods

- Materials are not required to be listed but they have to be mentioned in the methods
- It is optional to show photographs of experimental setup.
- It is required to describe:
- How di you set up your experiment?
  - How did data was collected?
  - How often?
  - How the data was analyzed (math calculation, statistical program, units, computer software)?

Materials and Methods

Thirty, 6-weeks-old pullets (5 different breeds) were randomly allocated into three 4x4ft indoor metal pens (n =10). The individual pen floors were covered with clean pine shavings for litter. Each pen was equipped with one feeder and one drinker (3.G) and a heating lamp. Each pen of birds was feed a different commercially formulated locally available feed (ad-libitum) for 14-days. Diets were formulated with different elves of CP (8.5%, 15%, and 20%). Compositions of the experimental diets are shown on Table 1. Feed intake was recoded daily and birds were individually weighted on day 0, 7 and 14 of the experimental period. Total weigh gain and feed intake were calculated by pen using a spreadsheet (Number for Mac 2012: Apple Inc. 1 Infinite Loop Cupertino, CA).

- Set up
- Collection & Frequency
- Analysis &Calculations

Result & Conclusions

Results

- Describe and display data
- Using:
  - Tables, photographs, figures and written text
- Figures and table must have a titles number and units of measurement

Conclusions

- Fists sentence must restate the hypothesis or research question
- Second sentence answer research question or confirm hypothesis stating if there is a connection between the two variables.
- Following sentences: use background research to explain results and procedures that influenced the results.

Results

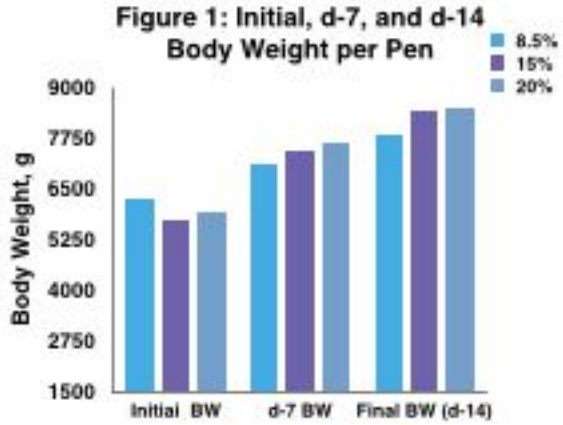


Figure 1: Initial, d-7, and d-14
Body Weight per Pen
8.5%
15%
20%
Body Weight, g
9000
7750
6500
5250
4000
2750
1500
Initial BW
d-7 BW
Final BW (d-14)

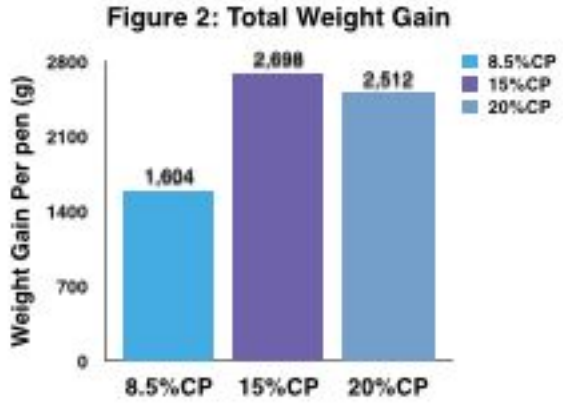


Figure 2: Total Weight Gain
8.5%CP
15%CP
20%CP
Weight Gain Per pen (g)
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2100
1400
700
0
1,604
2,698
2,512
8.5%CP
15%CP
20%CP

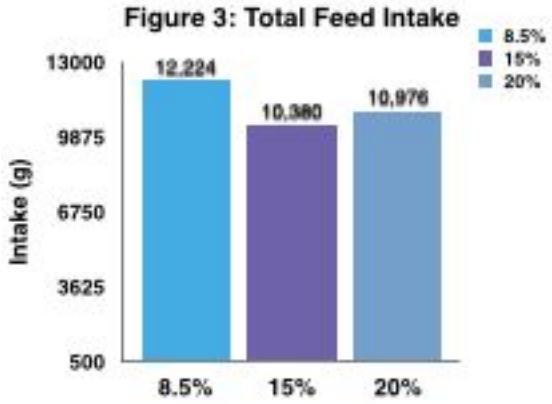
Figure 3: Total Feed Intake
8.5%
15%
20%
Intake (g)
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3625
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12,224
10,380
10,976
8.5%
15%
20%

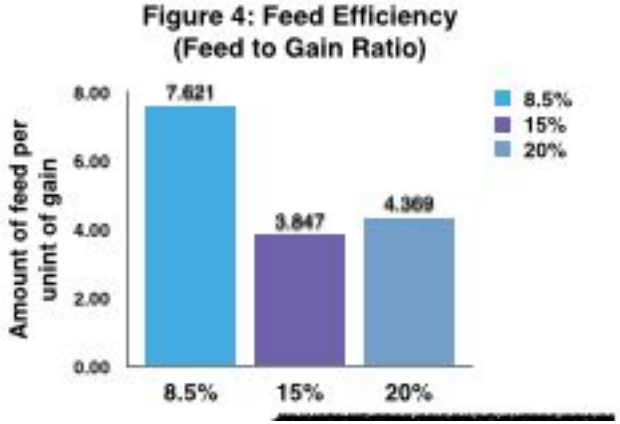
Figure 4: Feed Efficiency
(Feed to Gain Ratio)
8.5%
15%
20%
Amount of feed per
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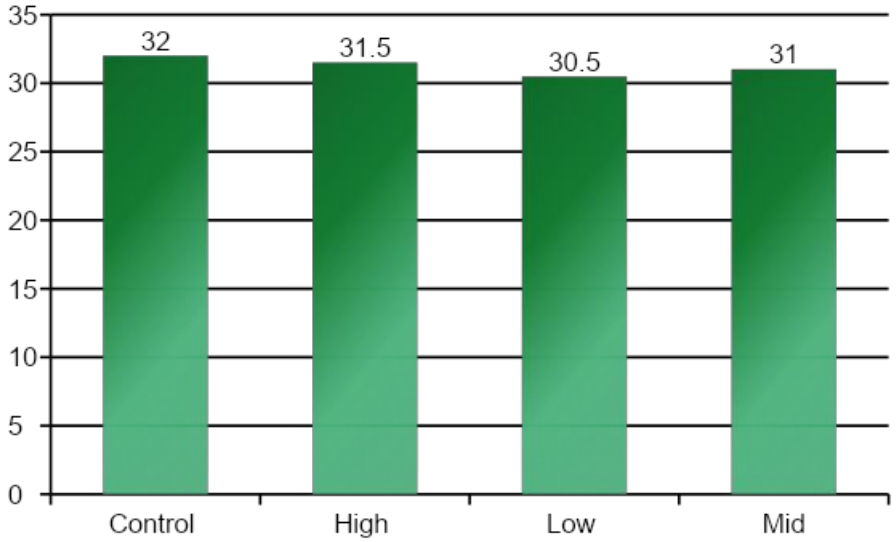
4.00
2.00
0.00
7.621
3.847
4.369
8.5%
15%
20%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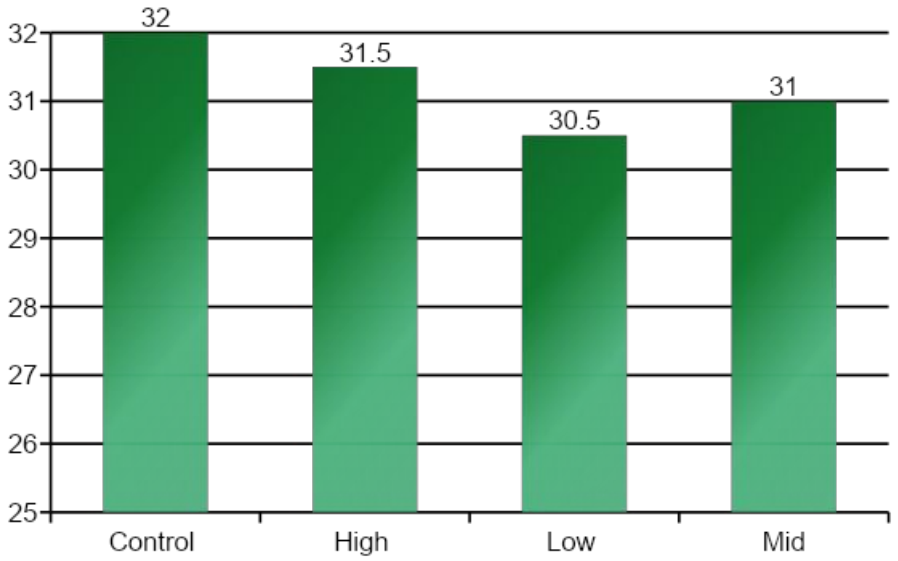
32
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31.5
30.5
31
Control
High
Low
Mid

Written Results

- The effect of increasing levels of CP protein percentage on body weight gain is shown in Figure 1. It was observed that body weight tended to increased as the diet PC % increased. Total weight gain (shown in Figure. 2) was greeted for those pullets consuming a 15% CP diet and lower for those fed a diet containing 8.5% CP. Considering the entire experimentation period (d1-d14), increasing the protein content of the diet increased the weight gain of 6-week-old pullets. Figure 3 shows (14 days) a tendency of a negative correlation between feed intake and increasing CP % in the diet, with the highest intake observed in pullets consuming a 8.5 % CP and the lowest feed intake observed in those consuming 15% CP.

Conclusion

It was predicted that pullets being fed a diet containing 15% CP would experience a greater weight gain requiring less feed intake. After 14 days of treating three groups of pullets with 8.5, 15, and 20% CP in their diets, it was concluded that pullets fed diets 15% CP consumed less feed, were more efficient, had a greater weight gain than those fed c 8.5 or 20% CP in the diet. These findings supported previous research results indicating that dual-purpose-breeds required between 16 and 19% CP in their diet to attain optimal growth, bone, muscle, and feathers development (Frame, 2008)

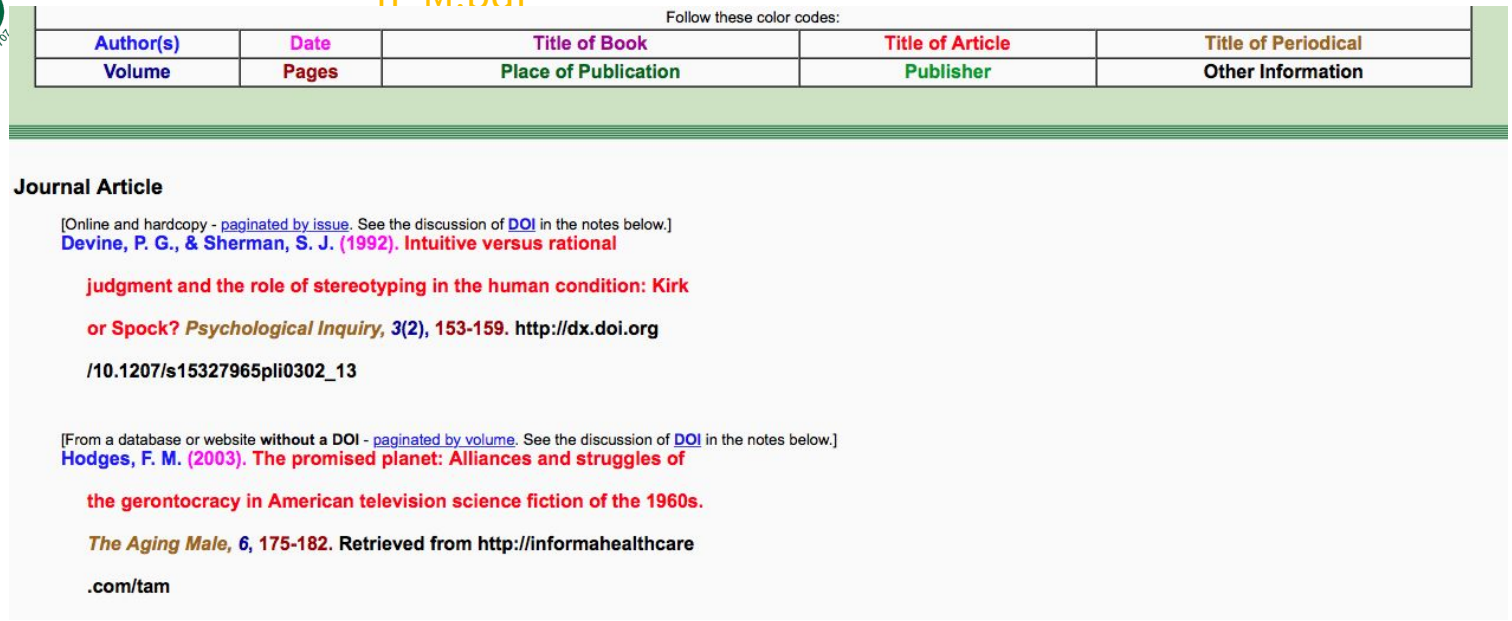
Restated Hypothesis

Answer

Connection

Work Cited or References

- Include an American Psychological Association (APA) style cited list
- If images from the web were used, it is important to refer the website used
- http://writing.wisc.edu/Handbook/American_Psychological_Association_%28APA%29_Documentation_M.pdf



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Volume	Pages	Place of Publication	Publisher	Other Information

Journal Article

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Devine, P. G., & Sherman, S. J. (1992). Intuitive versus rational judgment and the role of stereotyping in the human condition: Kirk or Spock? *Psychological Inquiry, 3*(2), 153-159. http://dx.doi.org/10.1207/s15327965pli0302_13

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Hodges, F. M. (2003). The promised planet: Alliances and struggles of the gerontocracy in American television science fiction of the 1960s. *The Aging Male, 6*, 175-182. Retrieved from http://informahealthcare.com/tam

http://www2.liu.edu/cwis/cwp/library/workshop/citapa.htm.

Acknowledgements

- It is a formal printed statement that recognizes individuals and institutions that contributed to the work being reported
  - If more than 3 individual from the same institution contributed, its preferable to acknowledge the institution
  - When acknowledging individuals, preferable not to use titles, honorifics, positions or awards.
- Always acknowledge financial support of the research

Creating the Poster

- Each Poster Competition have specific requirements
- Requirements for Roscoe Collegiate ISD
  - Programs: Keynote, Numbers & Pages
  - Dimension: 1024 X 768 pixels
  - Preferable light background
  - Aligned & Balanced
  - Logos (representing funding institutions)

Key Features of a Scientific Poster

- Must attract the audience
- Must quickly oriented the reader to the key points
- Should be logical arrange
- Should have clearly labeled sections
- Text and figures should be legible from 3-5 feet away
- Use color to define relationship between different areas of the poster
- Don’t over use color
- Label all figures and include a brief caption for the figure

Scientific Writing

Concise and accurate with few words

In passive voice (no pronouns)

In past tense

Wordy: In the present report, the results of an experiment are described in which coffee and tea drinkers were tested to see whether……

Good: We tested coffee and tea drinkers to find out whether……..

Better: Coffee and tea drinkers were tested to investigate whether……..

The presentation

- https://www.youtube.com/watch?v=vMSaFUrk-FA
- https://www.youtube.com/watch?v=cRNQjo2IstY
- https://www.ted.com/talks/award_winning_teen_age_science_in_action?language=en.