EXPERIMENTAL TRIALS
AVIMETRIA-BIOINNOVO STRATEGIC ALLIANCE.

More than 100 Experimental Trials

After several years performing different experimental trials in poultry, I came to several conclusions:

- Only statistically-designed experimental trials allow adequate and reliable decision-making. For instance, they may indicate that a new product is not always better than that currently in use. Or it may be better, but its replacement is not cost-effective.
- The results of a new product are not always better than those obtained with the current product.
- Performing an experiment with 18 treatments and 18 controls involves simultaneously testing the treatments on 18 farms or investing 3 years waiting for results on a single farm. In addition, the variation among farms and during such a long period of time on the same farm needs to be taken into account.
- Obtaining answers for questions such as which genetic line, additive, vaccines, or equipment should be used within 60 days, means obtaining very valuable information in a short time.
- In the poultry industry, making the wrong decision can cause significant – and sometimes unpredicted – financial losses both for integrators and suppliers .
- Mistaken decisions are often sustained because the companies are not aware of them or refuse to acknowledge them.
- Statistically-designed trials would provide valuable arguments to correct these mistakes.

Examples

Brief summary of some trials: (mash feeds)

Genetics:

	line A	line B
Final body weight	2.933	2.815
FCR	1.998	2.054
Mortality	5.52	5.47
PEF	283	264
Age	49	49

Growth promoters:

Product	A	B	C
Final body weight	2.603	2.556	2.671
FCR	1.844	1.964	1.926

Mortality	3.80	4.65	3.79
PEF	277	253	262
Age	49	49	49

Coccidiostats:

	A	B	C	D	E
Final body weight	0.958	1.651	1.637	1.689	1.695
FCR	2.441	1.629	1.635	1.596	1.589
Index	71	1651	1657	3378	3390
Rank	5th	4th	3rd	2nd	1st
Age	35	35	35	35	35

Antibiotics:

	A	B	Control
Final body weight	1.475	1.481	1.229
FCR	1.292	1.334	1.532
BW/FCR ratio	1.142	1.110	0.802
Lesions	negative	negative	positive

Mycotoxin binder:

Treatment	1	2	3	4
Body weight	1.721	1.717	1.701	1.730
FCR	1.642	1.651	1.732	1.641
BW/FCR ratio	1.048	1.040	0.982	1.054
Mortality	1	1	6.67	1.20
Age	35	35	35	35

The impressive growth of the poultry industry worldwide is a result of constant performance of statistically-designed experimental trials that support the introduced changes.
This tool has been applied by genetic companies to determine the possible progress of new lines compared with the previous ones, allowing nutritionists to establish the guidelines to achieve the optimal performance of these new lines.
Suppliers of pharmacological and immune products, and of equipment also develop their products and recommendations for use according to strict statistical and epidemiological studies in order to ensure their quality and effectiveness.

Universities and institutions around the world have designed, built, and tested new poultry houses to promote energy and building-material savings in poultry production.
In the Center for Research in Veterinary and Agricultural Sciences (CICVyA) of INTA Castelar, Buenos Aires, Argentina, Bioinnovo S.A. built an experimental poultry house with 45 pens with temperature control and independent feeders and drinkers; a modern unit for the development of therapeutic proteins in eggs; and a diagnosis and R&D laboratory.

Main mistakes made when conducting experimental trials

One of the most common mistakes observed in experimental trials is dividing a broiler house in half and comparing the two halves, or evaluating one row of layer cages with another. It is just like tossing a coin: the result may be heads or tails.

Example of mistakes made by the poultry industry in Argentina

A widely-known example was the introduction of nipple drinkers. Despite the significant investments made, there was general lack of knowledge on the use of this type of drinkers. The equipment and related information were imported and resulted to be unsuitable to the high water intake of broilers in Argentina. No comparative trials were carried out, and this mistake caused substantial financial losses.

Practical trial

Try testing the following hypothesis: “When tossing a coin, the possibility that it lands on heads or tails is 50 %.”
However, if we toss a coin ten times, it may land 6 times on heads and 4 times on tails. Therefore, at this point, it is not possible to test the hypothesis yet. If we continue to toss it, we will see that, as we increase the number of tosses (samples), the result will approach 50 %
This is what happens with the half-house method. At least 10 trials using this methodology are required to reach a valid conclusion about the comparison we are making. This can take about two years, and result in major evaluation errors derived from differences in genetics, weather, health status, management, etc., during this long period of time.

What should be done

In order to minimize variation, several replicates must be simultaneously tested, which is equivalent to tossing the coin several times in a row.
Several similar pens, housing the same number of birds of the same genetic line and of the same sex, if possible, are needed to minimize the variation.
The higher the number of pens (replicates) per evaluated product (treatments), the lower the error, allowing us to safely determine if the differences between treatments A and B are significant.

Sensitivity

The higher the number of replicates, the higher the test sensitivity. See the table below:

	Number of replicates per treatment					
Number of birds per pen	**2**	**3**	**4**	**6**	**10**	**20**
10	* 13.60	7.17	5.47	4.07	2.95	2.02
50	6.00	3.20	2.44	1.81	1.32	0.90

* difference in error percentage

If we use two replicates **(two pens)** with **10** birds each per treatment, the error will be 13.60 %. This means that if the average final body weight of a treatment is 2.700 kg, the body weight of the other treatment being compared should be 3.067 kg (+ 13.60 % of 2.700 kg) to obtain a statistically significant difference. However, if we have **20 replicates** (pens) with the same number of birds per treatment (which would be the equivalent of tossing the coin 20 times), the test sensitivity is higher (or the error is lower): 2.02 %. Therefore, at the same body weight of 2.700 kg, birds of the other treatment should weigh 2.755 kg to obtain statistically significant difference.
If we increase the number of birds per pen to **50**, sensitivity is even higher. Using 20 replicates, the error would be 0.90 %, which would require only 24 g higher body weight (2.724 kg) compared with the control to obtain a significant difference.
In summary, higher numbers of replicates and of birds per pen means higher sensitivity, that is, lower error or higher confidence of the results.
We have facilities ready for trials with caged layers. We only need to choose a row of cages.
Example
If we have 100 layers (equivalent to 25 cages with 4 birds each or 33 cages with 3 birds each) per treatment distributed in four replicates, the error will be 4 %. That is, if each hen lays an average of 250 eggs, the comparative group needs to lay more than 260 eggs to achieve significantly different results. However, with twenty replicates, we obtain higher sensitivity, that is, the error is 2 % or five eggs.

Conclusions

This brief description allows us to conclude that the decision of using new genetic lines or new products, equipment, etc., must be made based on experimental trials or on the experimental results provided by the supplier, thereby reducing the possibility of making the wrong choice before a new product is adopted by the company.

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Experimental Farm

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Experimental trials with broilers and layers, testing of poultry products (drugs, growth promoters, genetic lines, vaccines, etc.).
Application of Mercosur standards for the approval of new products.

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About BIOINNOVO
Bioinnovo is a leadership case. It is the first company of its kind created by Act 25.467 of the National System of Science, Technology and Product Innovation under the “Program to Promote Technology-Based Companies” (EMPRETECNO PAE EBT of FONARSEC).
It has two independent units:
BIOINNOVO IGY is focused on the development of animal health products based on chicken egg yolk immunoglobulins for the control of the main pathogens that affect animal production.
The mission of BIOINNOVO EXPERIMENTAL FARM is to introduce and to adapt the different scientific and technical advances produced by agricultural science in order to improve poultry performance and quality.
Bioinnovo is a public-private technology-based company created by a partnership between the National Institute of Agricultural Technology (INTA) of Argentina and the animal health company Vetanco S.A.

About Avimetria
Avimetría is a company established by poultry professionals, specialized in consulting, in poultry production statistics of Argentina, and in experimental design, monitoring and control. The results of Avimetria trials have provided regulatory support to major Argentinian and international companies. The experiments designed by Avimetria ensure statistically relevant results for the registration, development and evaluation of poultry health products. Avimetria monthly provides to its subscribers with consolidated statistics on the production, productivity, trends, costs, and foreign trade of both meat- and egg-type poultry industry, as well as information on licensed vaccines.