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POLYPHENOS INFLUENCES NEUROTRANSMITTER ASSOCIATED WITH WELL-BEING AND ALLOMETRIC GROWTH OF BROILER CHICKENS

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INTRODUCTION

- Reactive oxygen species (ROS), reactive nitrogen species (RNS) and reactive sulfur species (RSS) are **Free radicals**, that are producing in almost all metabolic pathway as breath, digestion and immune response, to give some examples;

- In low to moderate amounts**, Free radicals** are beneficial both in the regulation of processes that involve the maintenance of homeostasis and in a wide variety of cellular functions.

- In high dosage it can cause lipid peroxidation in cell membrane, DNA damage, protein denaturation, damage in cells and tissue.

- **Oxidative stress is** defined as an alteration in the balance between the production of **Free Radicals** and antioxidant capacity in the body;

INTRODUCTION

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Oxidative Cause:

- Immunosuppression (more diseases)
- **Reduces well-being**
- **Muscle injury** and losses at the slaughterhouse
- Reduce performance
- Increase Mortality
- Reduction in the shell of life for meat, eggs and milk

INTRODUCTION

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PLANTS COMPOUNDS

Improve performance and meat quality;

But also improve health and ***stress resistance***

Serotonin

- *is considered an important signaling molecule in several neurotransmitter functions in the brain*
- *WELFARE*

Outside the brain, serotonin plays a key role in regulating the contractility of the gastrointestinal smooth muscle and epithelial secretions;

Serotonin significantly promoted growth of skeletal muscle fibers

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Blend of polyphenols

obtained by a natural extraction process that helps to prevent oxidative stress and their consequences;

High antioxidant response

- *Anti free radical;*
- *Vitamin E regeneration;*
- *Inhibition of the redox sensitive transcription factors;*
- *Inhibition of pro-oxidant enzymes.*

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MATERIAL AND METHODS

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Objective

This study assessed the effect of a blend of polyphenols (Silvafeed ATX® – Italy) levels on well-being and allometric growth of broiler chickens.

Ross

1280 one day-old chicks

14 birds/m^2

Control – no addition

- **250ATX** - 250 g/ton Silvafeed® ATX
- **500ATX** - 500 g/ton Silvafeed® ATX
- **1000ATX** - 1000 g/ton Silvafeed® ATX

*Corn and soybean diet based Pre-starter, starter, grower and finisher diet (Rostagno et al. 2017).

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Approved by Ethical Committee - Federal University of Grande Dourados (**Protocol CEUA/UFGD 02/2022**)

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Bird Behavior and Well-Being

At 40 days

Birds were submitted to 3 well-being tests:

- **Latency-to-lie:** is a method employed to assess the time the bird takes to sit when exposed to an uncomfortable situation;

- **Modified touch test:** an assessor entered the pen and extended his or her arms and counted how many animals could be touched;

- **Grab test**: Assessor tried to hold the birds, simulating them being grabbed, and rating the response from 1 to 5.

MATERIAL AND METHODS

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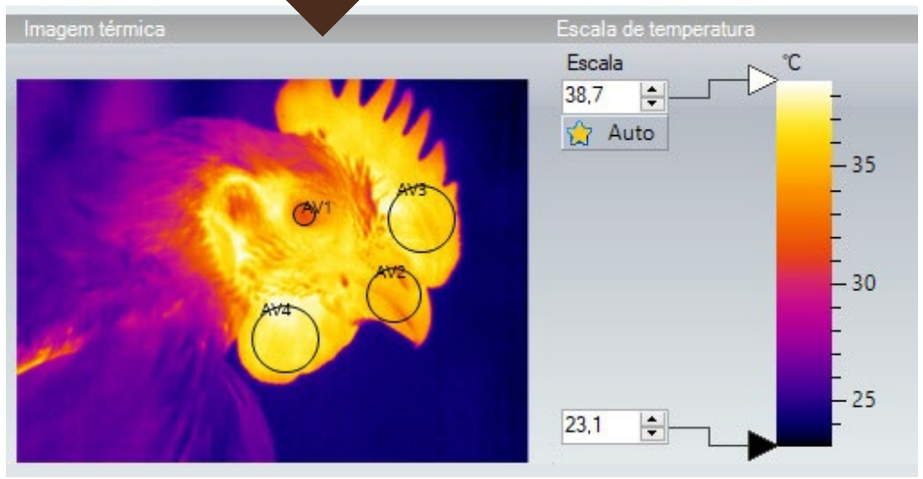
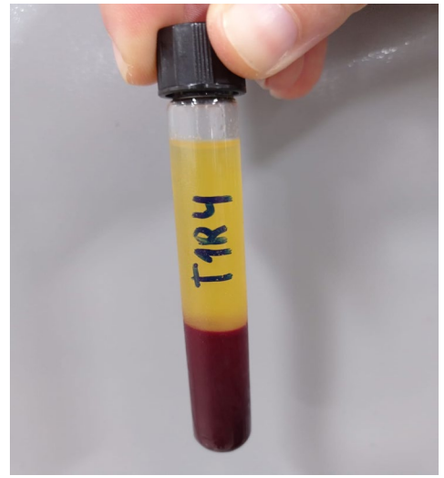
Thermal Imaging (IRT)

Eye temperature, crest, dewlap and beak.



Serotonin levels

Blood samples was collected at 41 days.



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MATERIAL AND METHODS

At 42 days

Sixteen birds per treatment were selected to be submitted to slaughter;

- Pre-cooling (10-18 ºC 12 min);
- Cooling (0-2 ºC 18 min);
- Dripping (5 min);
- Carcass cuts.

Allometric equations were determined from the weight of commercial cuts of carcass.

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Silvafeed® ATX for broilers

- The **study of relative growth** was carried out using the power equation: lnY = lna + b lnX + lnei (Huxley 1932).

- **Well-being tests** were estimated by the SAS GLIMMIX.
- **Serotonin levels** were analyzed using the SAS MIXED procedure and estimates were subjected to regression analysis and Dunnet test.

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Silvafeed® ATX for broilers - Results

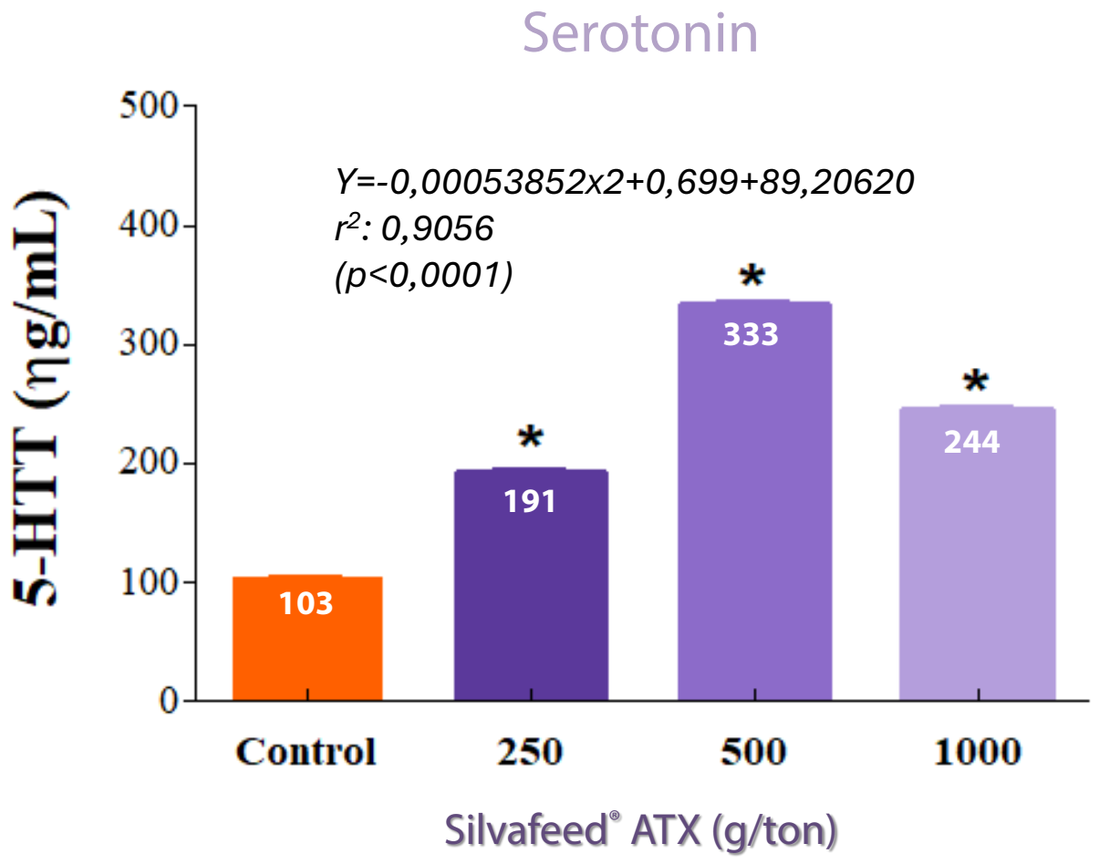
ANIMAL WELFARE

Silvafeed® ATX **increased serotonin levels** in broilers significantly compared to control.

Serotonin is a neurotransmitter that mediates satisfaction and happiness and is closely related to high welfare.

Silvafeed® ATX did not singnificantly affect other evaluated welfare parameters:

- Catch test;
- Latency to lie;
- Approximation test
- Thermal Imaging (IRT) – Eye temperature, crest, dewlap and beak.



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Silvafeed® ATX for broilers - Results

Allometric coeficiente **(b)** in broilers at 42 d in diferente treatments **b** >1 = late growth **b** <1 early growth

ALLOMETRIC GROWTH*

Silvafeed® ATX induced an inversion on growth rate compared to control.

Silvafeed® ATX groups showed an early growth of legs compared to breast but there is no difference in carcass yield or breast and leg yield between treatments.

Treatment	Carcass parts			
	Breast	Wings	Back	Legs
	b±SD	**b**±SD	**b**±SD	**b**±SD
Control	0,87653±0,243	0,61777±0,228	0,95973±0,472	1,35947±0,240
250 ATX	0,87653±0,243	0,28949±0,170	2,28583±0,543	0,48958±0,162
500 ATX	**1,31950±0,332**	1,09953±0,321	0,67209±0,593	**0,65310±0,290**
1000 ATX	0,69884±0,200	0,55864±0,239	5,05244±0,628	0,37654±0,157

*Allometry refers to the fact that some parts of body growth at different rate than the body a whole during bird development.

Serotinin increased branching, differentiation and fusion of myoblasts into myotubes were also observed

(Chandran et al., 2012)

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Table. Carcass yield of broiler chickens at 42 days

No difference on carcass yield

Carcass yield, %	Silvafeed ATX levels, g/ton				MSE[1]	P[2]
	0	250	500	1.000		
Hot carcass	81,154	81,144	81,985	80,771	0,226	**0,2750**
Chilled carcass	81,801	81,930	82,760	81,579	0,211	**0,2071**
Breast	42,656	47,726	42,448	42,435	0,269	**0,9748**
Legs	26,127	26,416	26,403	26,603	0,140	**0,7253**
Boneless Breast	35,435	35,487	35,371	35,453	0,253	**0,9988**
Boneless Legs	18,440	18,788	18,623	18,333	0,133	**0,6459**
Wings	9,914	9,265	9,139	9,368	0,054	**0,5035**
Back	17,648	16,957	17,193	16,639	0,180	**0,2731**

P<0,05

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CONCLUSION

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Silvafeed® ATX **promoted increase in serotonin levels** and **modulate the allometric growth** of breast muscle growth **without changes** the final carcass yield.

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