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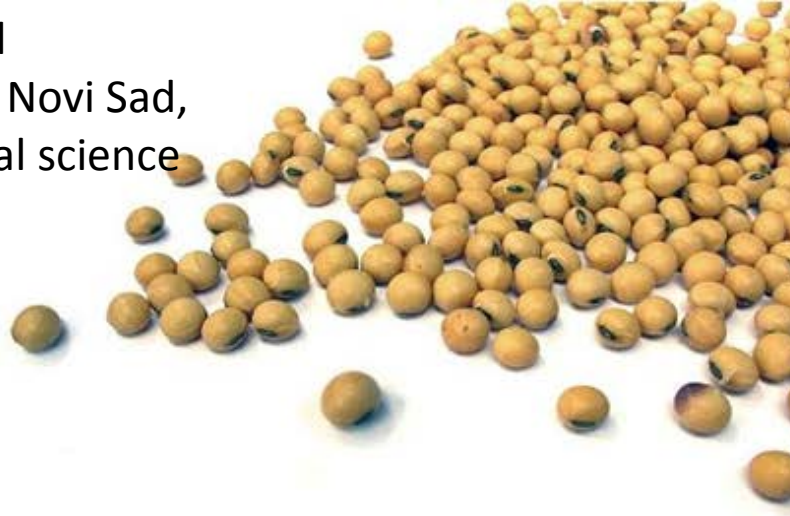

EFFECT OF USING A BROILER DIET WITH DIFFERENT LEVELS OF KTI FREE SOYBEAN TO RETENTION OF NITROGEN

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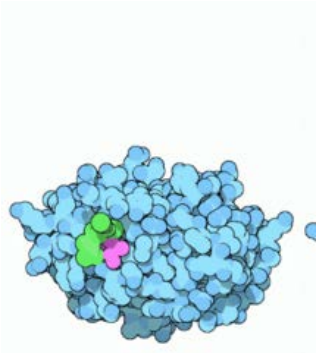
Soybean

- The main source of protein
- The highest quality protein
- Meets the needs of all essential amino acids
- Very rich in lysine 3.00 to 3.26%
- Methionine and cysteine - the limiting amino acid
- The high content of unsaturated oils 18 - 20%

Anti-nutritive substances

- Trypsin inhibitor - to inhibit the function of the digestive proteolytic enzymes trypsin and chymotrypsin;
- Lectine, -Reduces absorption of nutrients;
- Urease, - the conversion of urea to ammonia
- Lipoxidase enzyme - catalyzed oxidation of lipids

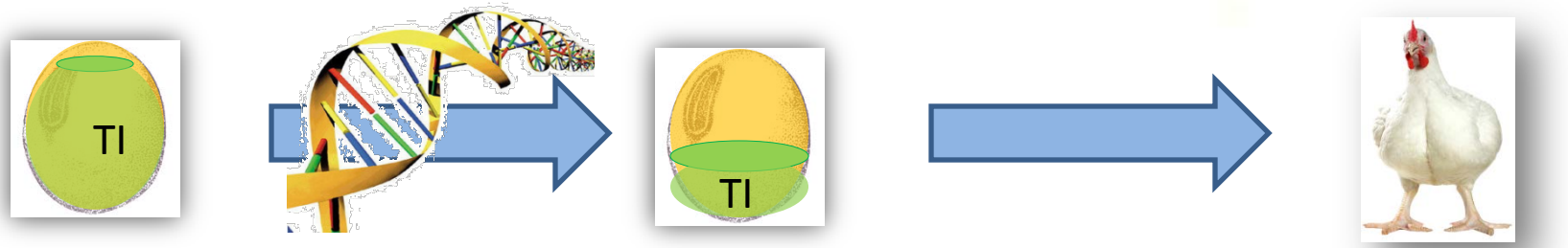
- Trypsin inhibitor
- **Kunitz Trypsin Inhibitor - KTI**
- **Bowman-Birk Trypsin Inhibitor - BTI**



Methods of inactivation of anti-nutritional thermolabile factors

- cooking and autoclaving
- micronisation
- extrusion
- expansion
- toasting,
- roasting

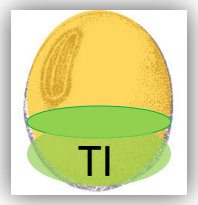
- Applying the method of selection in creating new KTI free varieties, which avoiding the application of processing - heat treatment.
- This type varieties of soybeans (KTI free) have been studied over the past 20 years.
- Pioneer of this venture was Hymowitz (1986) developed a KTI free soybean.

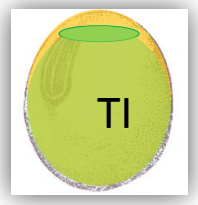


- Soybean, variety "Lana" - which was used in this experimentm, is the result of a domestic (Serbian) research program selection, at a reduced presence of Kunitz trypsin inhibitor in soybean.

- Table 1. Level of TI in soybean used in research

	RAW	
	“LANA”	Convetional Soybean
TI (mg/g/min)	15,07	30,21

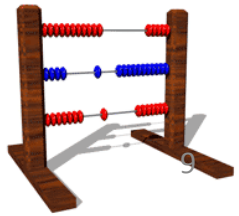




KTI –free soybean benefit

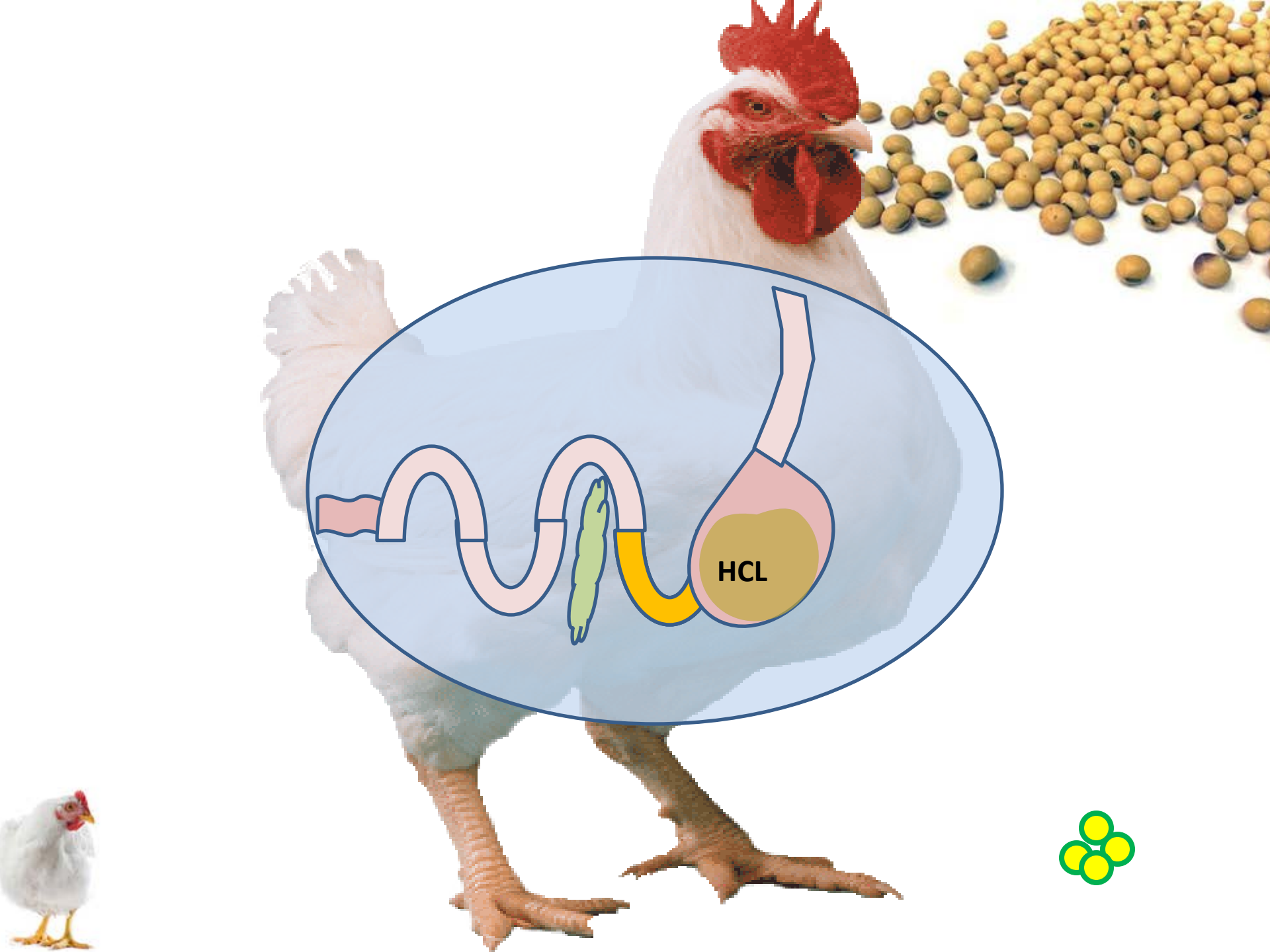
- Eliminating the cost of processing soybeans, which greatly burdened price of production.

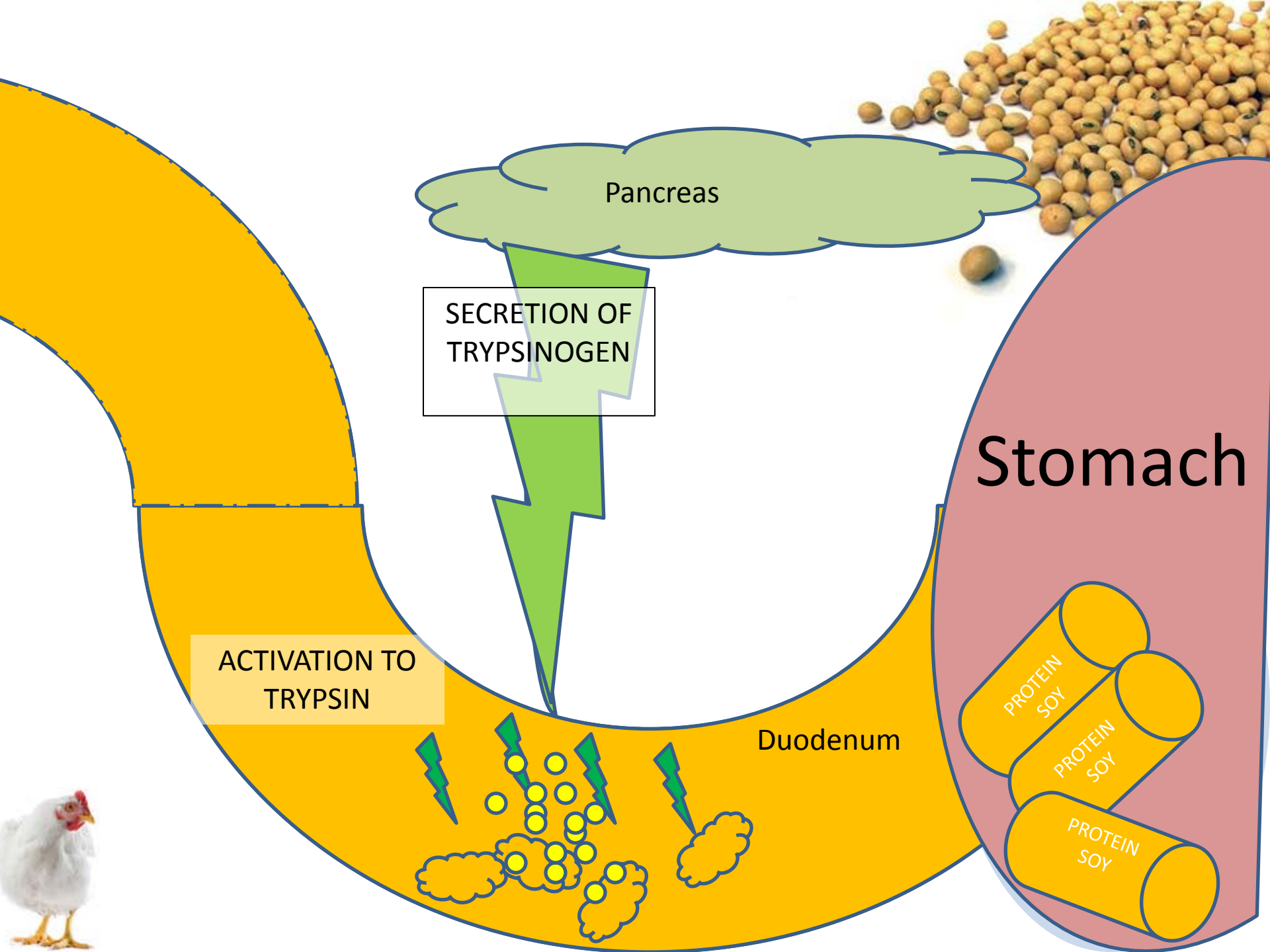
- The release of small and medium farmers of the manufacturing monopoly

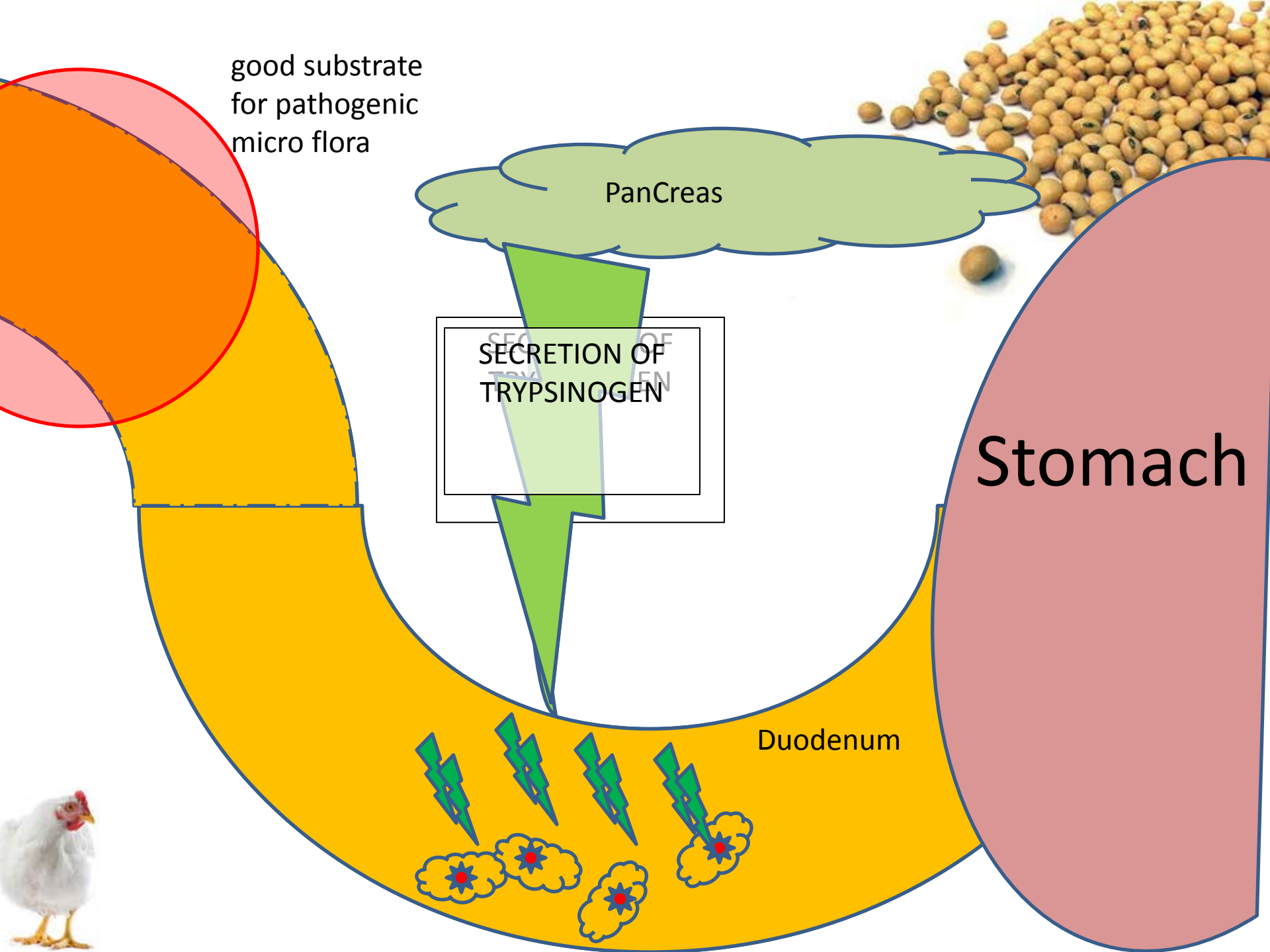


- However caution is necessary beacause KTI is one of main, but not only heat-labile antinutritive factor in raw soybean.

Inhibition of trypsin

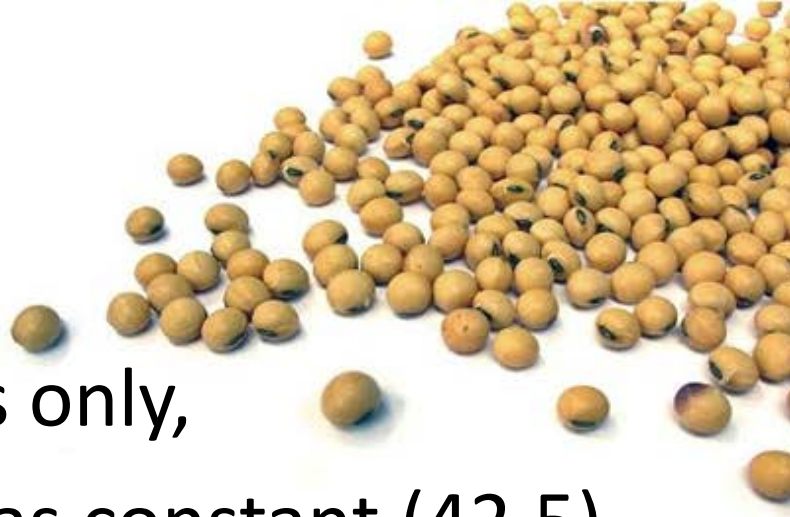

HCL


Pancreas
SECRETION OF TRYPSINOGEN
Stomach
ACTIVATION TO TRYPSIN
Duodenum
PROTEIN SOY
PROTEIN SOY
PROTEIN SOY


good substrate
for pathogenic
micro flora
PanCreas
SECRETION OF
TRYPSINOGEN
Stomach
Duodenum

Materials and Methods

Birds in experiment



- Hybrids Ross-308, 64 Males only,
- initial weight of chickens was constant (42.5)
- Metabolic cage
- The experiment included four groups of four replications.
- Food and water were available ad libitum, with a lighting regimen of 24 hours.

METHODS

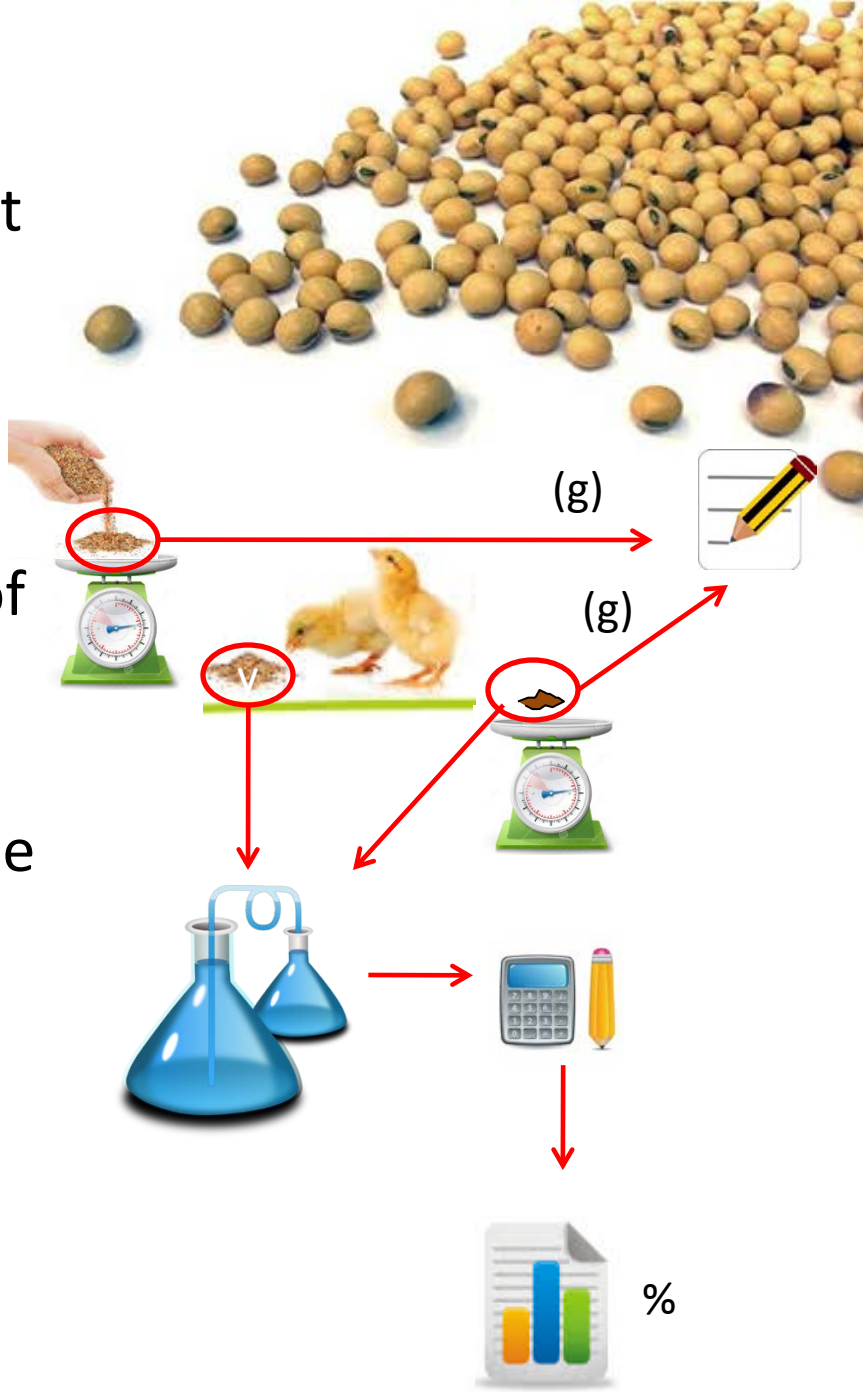
- In the experiment, we examined the retention of nitrogen by two different methods:
  1. Direct method,
  2. Marker method

- Direct method,

-requires accurate measurement of feed consumption and feces colection during the collection period.

-involves the analytical determination ,and calculation of the nitrogen content in the feed and feces.

-This is the hard way because the end results much depending of measurement accuracy of consumed feed and feces excretion.



- Marker method,

-Requires a homogeneous mixture of marker and feeds,

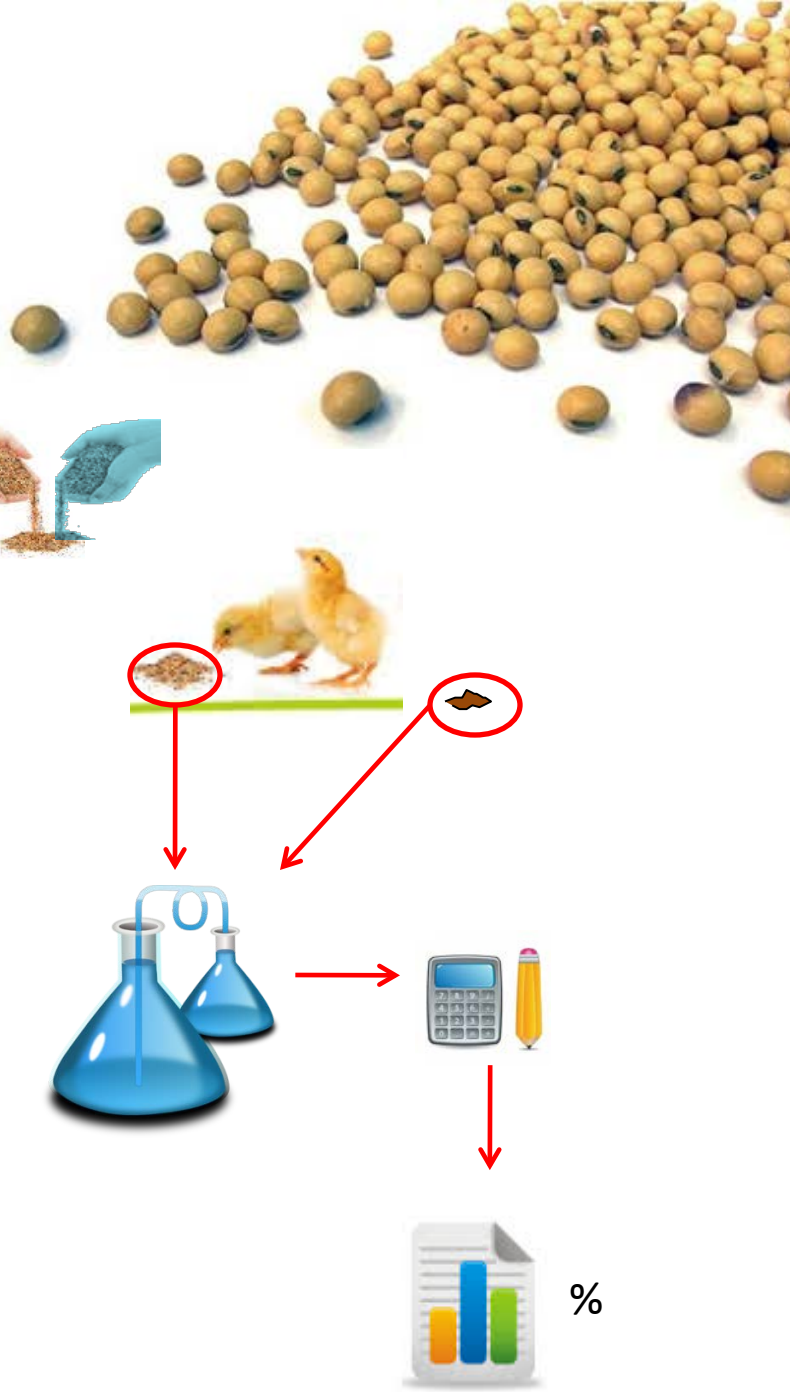
-Marker must be stable during passage through the digestive tract of animals

-Requires a preliminary period of feeding diet with marker, before the start of the collection period (cleaning up the digestive tract of remaining feed without the marker)

-Analytical determination ,and calculation of the nitrogen content in the feed and feces,

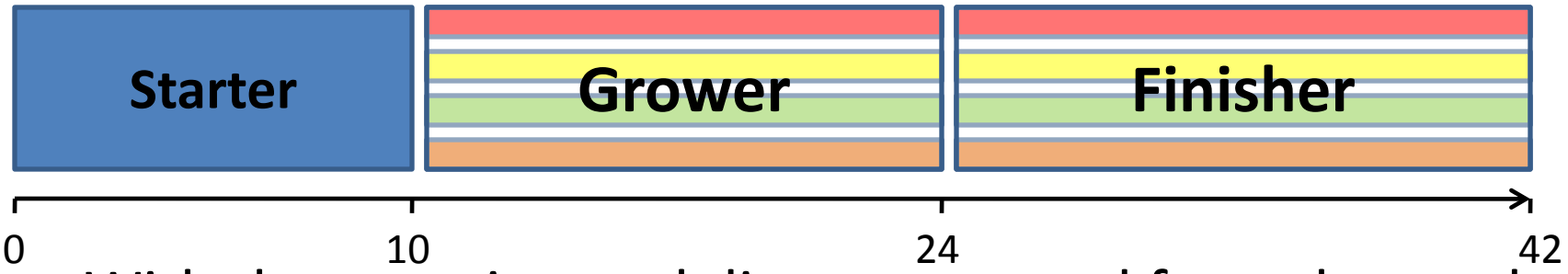
- Analytical determination of marker level in the feed and in the feces, (AIA – methode).

-Results should be put in relation to calculate retention.



- Preparation period 28 day (cage adaptation)
- 33 day start consumation ("cleaningdigestive tract from the remnants of food that did not contain marker)
- 36 day period of collection (3 days)

Experimental diets



- With the experimental diet was started from the tenth day.
- Earlier research indicates that young categories of animals, who use raw KTI free and lectine free soybeans have a high intolerance to heat untreated soybeans (Palacios et al., 2004;

Tretman groups

SL - group

SS - group

LG - group

SG - group

Nutrition in the experiment

Table 2. Chemical composition of starter mixture, %

Chemical composition of starter mixture	
DM (%)	89,71
ME	12,60
SP (%)	23,00
Lys. (%)	1,52
Meth. (%)	0,60
Thre. (%)	0,91
Ca (%)	1,00
P (%)	0,80
Na (%)	0,16
Cl (%)	0,23

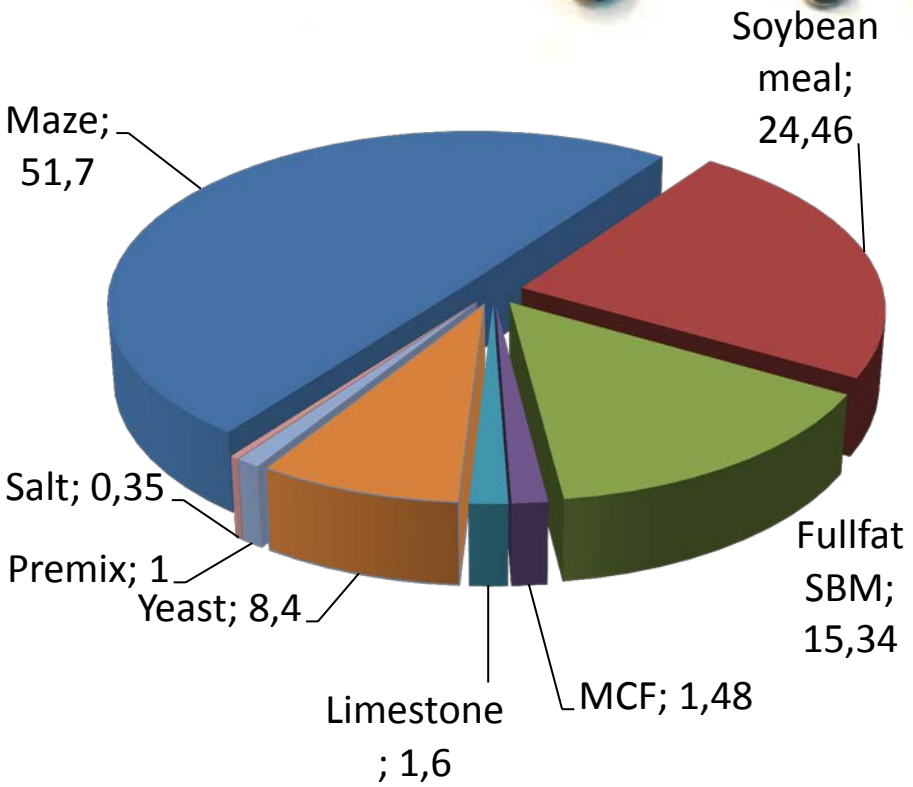


Chart 1. Structure composition of diet used in Starter mixture, %

Table 3. Structure composition of diet used in grower mixture, %

Ingredients	KTI-free		Conventional level of KTI	
	Raw (SL)	Extruded (LG)	Raw (SS)	Extruded (SG)
Maze (%)	49,87	49,95	53,65	53,35
Soybean meal (%)	12,03	11,95	8,22	8,52
Raw Soybean KTI-free (%)	30	-	-	-
Soybean KTI-free extruded (%)	-	30	-	-
Raw Soybean conventional level of KTI (%)	-	-	30	-
Soybean conventional level of KTI extruded (%)	-	-	-	30
Yeast (%)	4	4	4	4
Chalk (%)	1,4	1,4	1,4	1,4
MCP (%)	1,35	1,35	1,37	1,37
Salt (%)	0,35	0,36	0,35	0,36
Premix (%)	1	1	1	1
Tottal	100	100	100	100

Table 4. Chemical composition of grower mixture, %

Nutrients	SL	SS	LG	SG
DM (%)	90,43	90,43	89,83	89,83
ME (MJ)	**13,36 MJ**	**13,49 MJ**	**13,36 MJ**	**13,48 MJ**
SP (%)	**22,00**	**22,00**	**22,00**	**22,00**
Lys. (%)	1,59	1,48	1,49	1,49
Meth. (%)	0,61	0,59	0,59	0,59
Thre. (%)	0,96	0,89	0,91	0,92
Ca (%)	0,91	0,90	0,91	0,90
P (%)	0,77	0,76	0,77	0,76
Na (%)	0,16	0,16	0,16	0,16
Cl (%)	0,25	0,25	0,23	0,23

Table 5. Structure composition of diet used in finisher mixture, %

Ingredients	KTI-free		Conventional level of KTI	
	Raw (SL)	Extruded (LG)	Raw (SS)	Extruded (SG)
Maze (%)	51,71	51,82	55,56	54,36
Soybean meal (%)	9,16	9,08	5,32	6,54
Raw Soybean KTI-free (%)	30	-	-	-
Soybean KTI-free extruded (%)	-	30	-	-
Raw Soybean conventional level of KTI (%)	-	-	30	-
Soybean conventional level of KTI extruded (%)	-	-	-	30
Yeast (%)	4	4	4	4
Chalk (%)	1,4	1,4	1,4	1,4
MCP (%)	1,38	1,35	1,35	1,35
Salt (%)	0,35	0,35	0,37	0,35
Premix (%)	1	1	1	1
Celite ® 545 - marker	1	1	1	1
Tottal	100	100	100	100

Table 6. Chemical composition of finisher mixture, %

Nutrients	SL	SS	LG	SG
DM (%)	90,43 %	90,43 %	89,83 %	89,83 %
ME (MJ)	**13,46 MJ**	**13,60 MJ**	**13,47 MJ**	**13,56 MJ**
SP (%)	**21,00 %**	**21,00 %**	**21,00 %**	**21,00 %**
Lys. (%)	1,52 %	1,41 %	1,42 %	1,44 %
Meth. (%)	0,60 %	0,58 %	0,58 %	0,58 %
Thre. (%)	0,92%	0,85 %	0,87 %	0,89 %
Ca (%)	0,90 %	0,89 %	0,90 %	0,89 %
P (%)	0,76 %	0,74 %	0,76 %	0,75 %
Na (%)	0,16 %	0,16 %	0,16 %	0,16 %
Cl (%)	0,25 %	0,25 %	0,23 %	0,23 %

Results

Table 7. Retention of nitrogen in diet for broilers with different levels of KTI free soybean, %

	SL	SS	LG	SG
Retention of nitrogen-marker method (%)	48	48	57	60
	50	46	59	56
	52	46	51	56
	43	48	55	57
$\bar{x}$	**48[a]**	**39[a]**	**55[b]**	**57[b]**
Std.dev	±3,9	±1,2	±3,5	±1,9
Retention of nitrogen – method total colection (%)	54	51	64	69
	49	39	66	63
	48	43	58	62
	51	52	60	65
$\bar{x}$	**51[a]**	**46[a]**	**62[b]**	**65[b]**
Std.dev	±2,5	±6,3	±3,9	±2,9

a-b, - letter in super script by columns indicates to significant differences, ($p<0,01$).
a-a, b-b - letter in super script by columns indicates to no significant differences, ($p>0,05$)

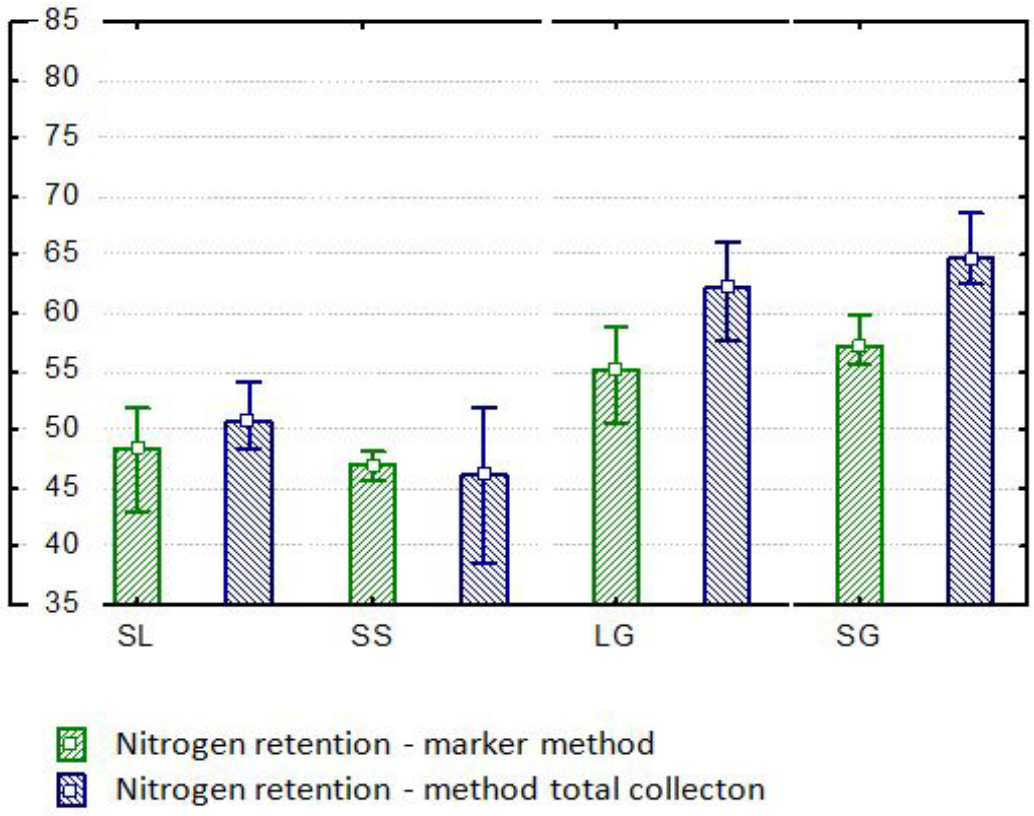


Chart 2 Retention of nitrogen in diet for broilers with different levels of KTI free soybean .

Conclusion

- The absence of heat treatment had a significant effect to nitrogen retention.

- SG and LG Group (heat-treated) had significantly better retention of nitrogen, no matter whether it comes directly or maker method

- SL group, had better retention than, SL group but not statistically significant

- Therefore, it can be finaly concluded that usage of whole (raw) soybean KTI-free, variety “Lana” is not suitable from the standpoint of nitrogen retention, for the chicken nutrition from 11th day at a concentration of 30% in diet.

Notification

- This is a research was basis for the setting up of new experiments and research, in determination level of use, heat untreated soybean variety "Lana" in diet for broilers.

ACKOWLEDGEMENT

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THANKS FOR YOUR ATTENTION