Measures to maintain a good Intestinal health in Brazil and other Latin American Countries

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Phibro Animal Health

MY FAMILY

Poultry Production in Some Latin American Countries

- Brazil and the Latin American Region – Characteristics

- ✓ Twenty two Countries produce broiler birds and layers.
- ✓ Turkey and other species are negligible.
- ✓ Brazil, Argentina, Chile are the main exporters.
- ✓ Per capita consumption range from 35 to 48 kg in those three Countries.
- ✓ Consumption in other Countries range from 20 – 35 kg.
- ✓ Approved AGPs and anticoccidial are widely used (Codex Alimentarius).
- ✓ Most meat output comes from Integrations: JBS, AURORA, BRF (Brazil), BACHOCO (Mexico), SUPER POLLO (Chile), SAN FERNANDO (Peru), other.

Poultry Production in Some Latin American Countries

- Brazil and the Latin American Region – Characteristics

✓ Typical production system is high concentration bids/square meter.

✓ Most popular genetics are ROSS and COBB.

✓ Specific demands from importers are attended: organic, vegetable feed, religious concerns, animal welfare etc.

✓ Environment and climate conditions are quite variable: tropical; arid; highlands, arid / desert, mediterranean, etc.

✓ Main production companies migrating to areas that are closer to ports and cereal producing regions and away from excess of heath or high altitude.

Climatic Zones in Latin America

- ***Highland***
- ***Humid Subtropical***
- ***Arid***
- ***Semi – arid***
- ***Tropical Wet (and dry)***

Mediterranean

Marine Costal

Climatic Zones in India

- ***Highland***
- ***Humid Subtropical***
- ***Tropical wet & Dry***
- ***Arid***
- ***Semi – arid***
- ***Tropical Wet***

Poultry Production in Some Latin American Countries

	USDA DABASE	BROILERS +	TURKEYS	
Year	Production - 1000 T.	Imports	Exports	Total
INDIA				
2015	3905	0	9	3896
2022	5457	0	8	5449
ARGENTINA				
2015	2139	17	316	1840
2022	2535	9	425	2119
BRAZIL				
2015	15332	1	3965	11368
2022	18387	1	4765	13623
CENT AM. & CARIBBEAN				
2015	1364	466	8	1822
2022	1442	565	8	1999
MEXICO				
2015	3060	899	14	3945
2022	3393	1240	22	4611

Poultry Production in Some Latin American Countries

- Brazil and the Latin American Region – Characteristics

✓ Feeeding systems usually follow nutrition models of USA, Brazil and sometimes Spain.

Some typical nutrient levels of *broiler bird feeds*

	Days of Age in Country A				Days of Age in Country B			
Nutrient	0-10	10-21	21-35	>35	0-10	10-21	21-35	>35
ME (kcal/kg)	3000	3100	3200	3300	2950	3000	3050	3100
CP (%)	23	22	21	19	22	20	19	17,5
Lys d (%)	1,35	1,25	1,15	1	1,3	1,2	1,05	0,9
Av.P (%)	0,5	0,46	0,44	0,4	0,5	0,47	O,40	0,36
Na (%)	0,23	0,18	0,18	0,18	0,26	0,18	0,16	0,16

R. Sanches et. Al.

Poultry Production in Some Latin American Countries

- Brazil and the Latin American Region – Characteristics

✓ Few Countries produce enough feed ingredientes locally.

Some typical diet ingredients for *broiler birds*

Raw Material	Origin	Pre-starter	Starter	Grower	Finisher
Corn	Argentina/USA	38,4	59	44	63
SBM	Argentina/USA	18	23	15	8
Full fat SB	Arg/Brazil/Paraguay	8,7	12	10	22
Fish meal	Ecuador, Peru, Chile	3	2,5	1	
Oil/ animal fat	Brazil, Arg. / Local	3	2,5	1	

R. Sanches et. Al.

Poultry Production in Some Latin American Countries

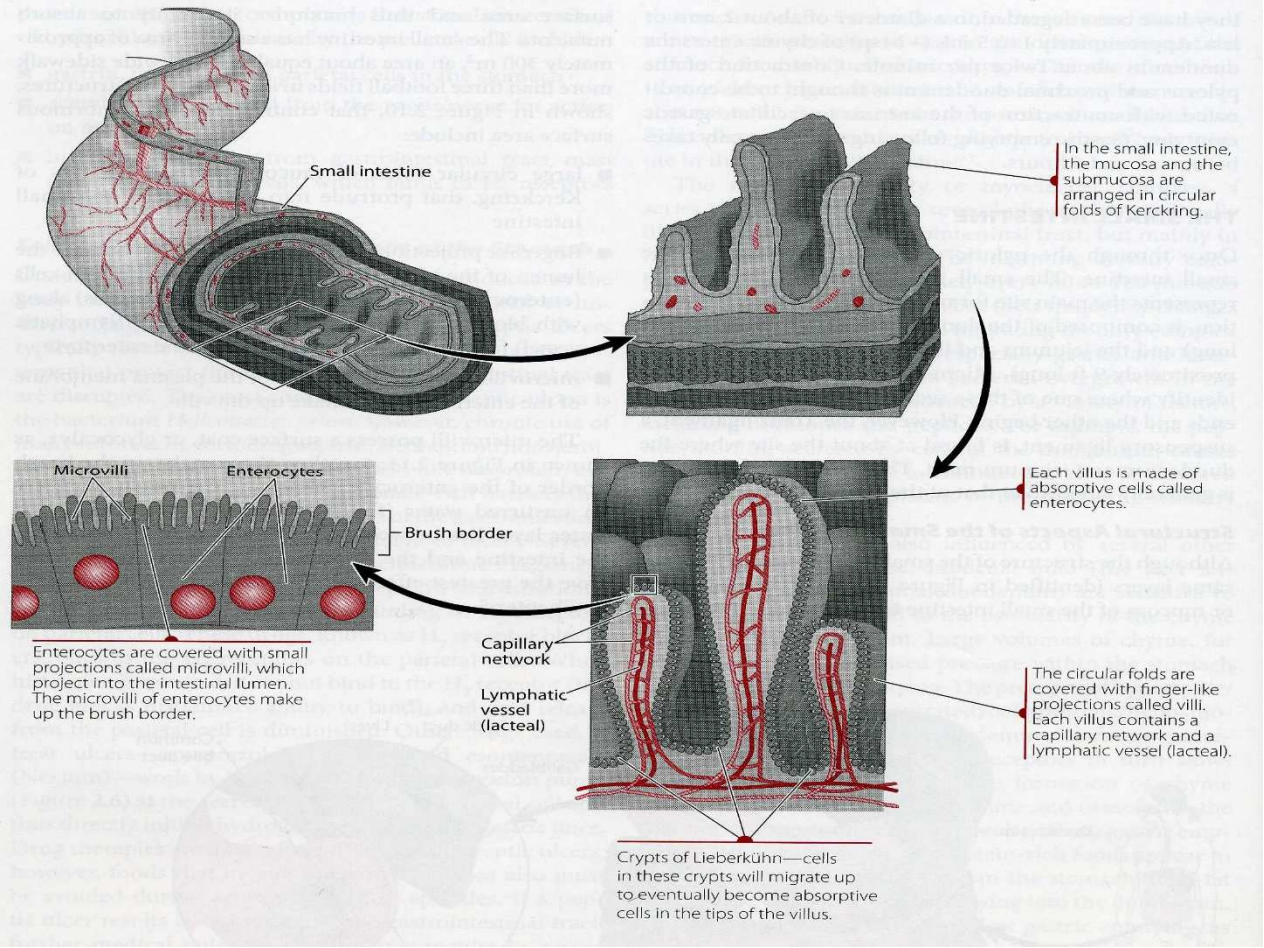
- Brazil and the Latin American Region – Characteristics

Typical nutrient levels and ages of *broiler breeders*

Nutrient	Starter	Grower	Breeder I	Breeder II	Male Diet
ME, min	2860	2775	2860	2820	2700
ME, max	2900	2900	2870	2870	2750
Protein (%)	19.5	15.5	16.0	15.5	12
Lys (%)	1.00	0.70	0.78	0.76	0.6
TSAA (%)	0.82	0.58	0.64	0.54	0.48
Sodium (%)	0.20	0.20	0.16	0.18	0.2
Calcium (%)	0.97	0.95	2.90	3.20	1
Av. P (%)	0.45	0.43	0.45	0.40	0.4

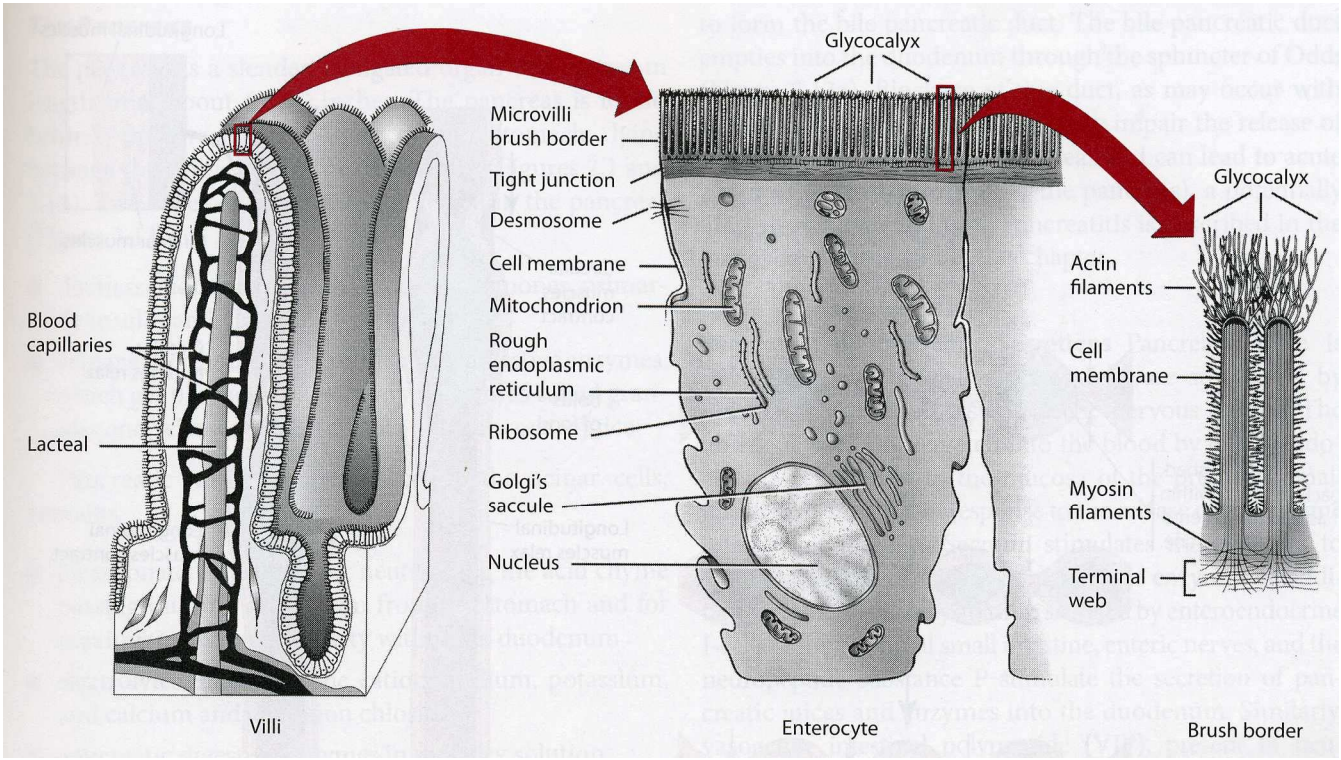
R. Sanches et. Al.

MAINTAINING A GOOD INTESTINAL HEALTH



Bird
Intestinal Morphology

MAINTAINING A GOOD INTESTINAL HEALTH



Bird
Intestinal Morphology

MAINTAINING A GOOD INTESTINAL HEALTH

- Hind intestine comprises four cell layers
- Is the site for water and electrolite re-absorption
- High concentration of mucus producing globlet cells
- Beneficial bacteria will brake carbohidrates and low digestible proteins and generate Volatile Fatty Acids.
- Diet raw materials can influence carbohidrate structure of mucosa with negative effect on the intestinal flora and on the intestinal health (Kelly et al.,1992).

Bird
Intestinal Morphology

MAINTAINING A GOOD INTESTINAL HEALTH

INTESTINAL MUCOSA DEVELOPMENT

Depends on two associated events
1 - Cell renewal: proliferation and diferentiation → in the crypts and along the villi
2 - Cell loss: extrusion → at the villi upper end

Bird
Intestinal Morphology

- The equilibrium of the two processes allows a constant turnover in the villi to keep it´s capacity to digest and absorb nutrientes

- Excessive fasting will generate cell death (yamaguchi et al., 1996)

- Among all organism tissues, intestinal mucosa is the one with the highest turnover rates

MAINTAINING A GOOD INTESTINAL HEALTH

Effect of environmental temperature (35°C) on the intestinal mucosa

Paramether	Temperature		Change %
Villi	22	35	
Height (mm)	938	762	-19
Weight - Humid (g/cm)	0,230	0,170	-26
Weight - Dry (g/cm)	0,058	0,040	-17

Mitchel & Carlisle, 1992

Bird
Intestinal Morphology

MAINTAINING A GOOD INTESTINAL HEALTH

Maintainance of intestinal epitelia and related structures demands 20% of the net energy ingested by the bird (McBride & Kelly, 1990).

From 80% to 90% of energy used by the digestive tract is consumd by the mucosa (Bird et al.,1994).

Bird
Intestinal Morphology

MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

Most of those factors are related to:

- Poor husbandry,
- Improper nutrition, poor quality feed
- Stress
- Diseases

MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

Most of those factors are related to:

- Poor husbandry: Litter and drinkers
- Improper nutrition/ poor quality feed
- Stress / temperature
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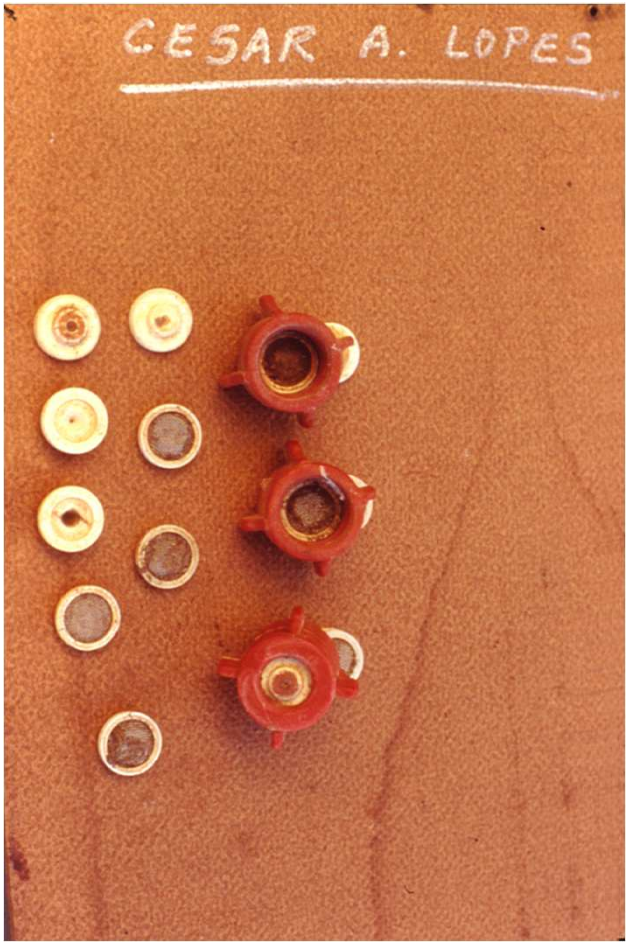
Wet litter - Brazil

- Litter and Drinkers

Wet litter - Brazil

- Litter and Drinkers



Wet litter - Brazil

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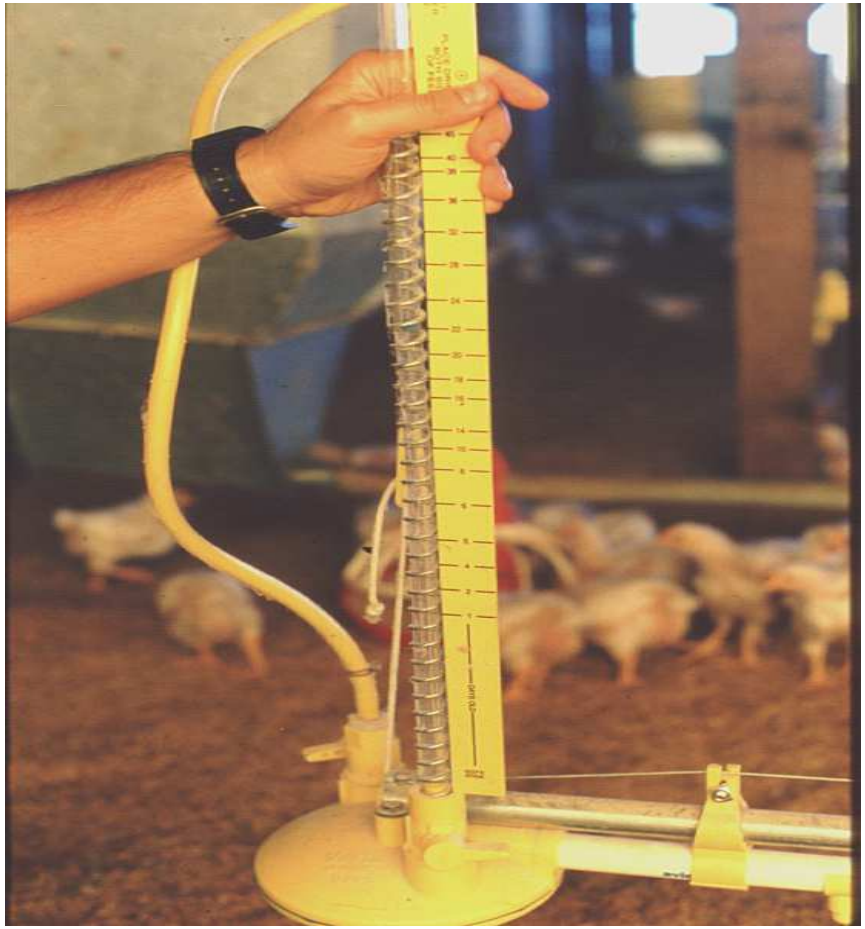
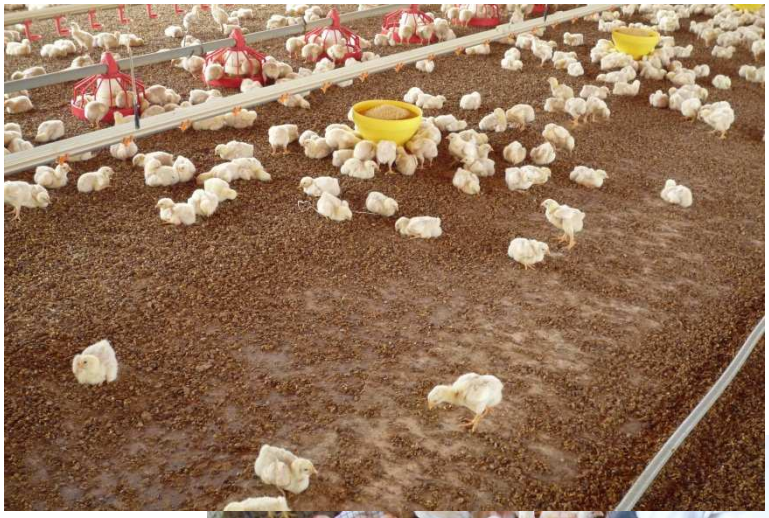


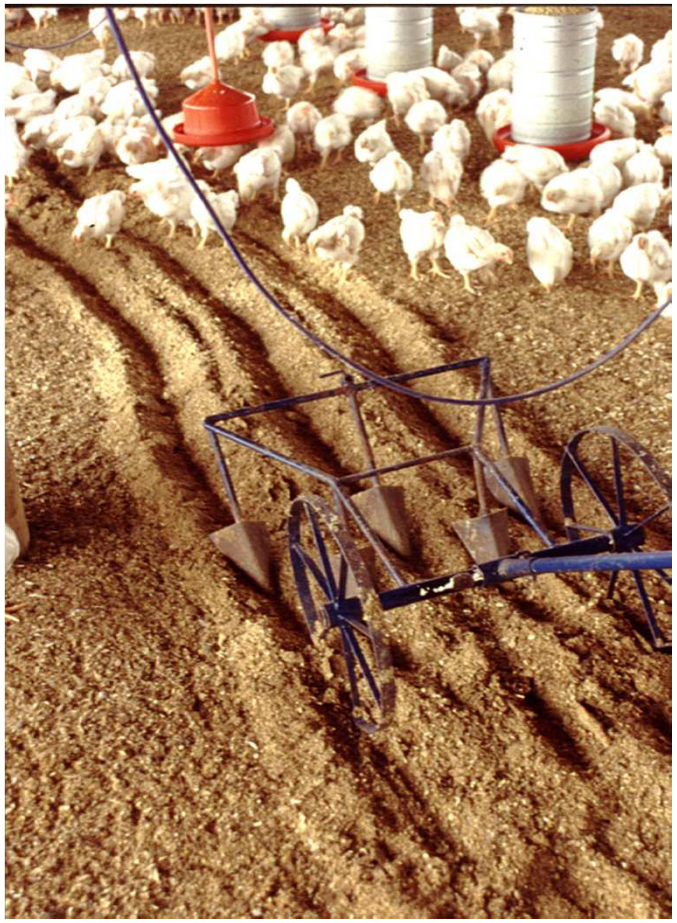
- Litter and Drinkers

Poor quality litter – high microbial concentration



Keeping a good litter: Brazil, Panama

- Litter and Drinkers

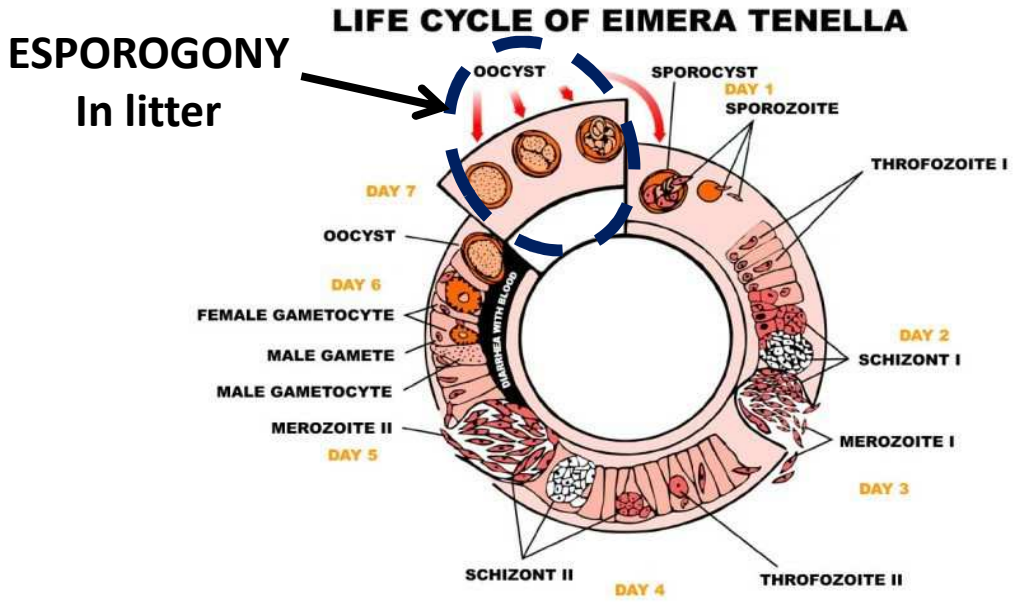


- Litter and Drinkers

Coccidia life cycle in the Bird and in the environment

Esquizogony and gametogony ➡ Anticoccidials do the job

Esporogony: in the litter ➡ WE must do the job



A recycled litter does not mean high challenge

Oocysts / g litter

- Litter and Drinkers

Age of birds	High challenge	Low challenge
2 weeks	0	0
4 weeks	2300	300
7 weeks	6500	1000
7 day withdrawal	80	60
14 day withdrawal	90	60

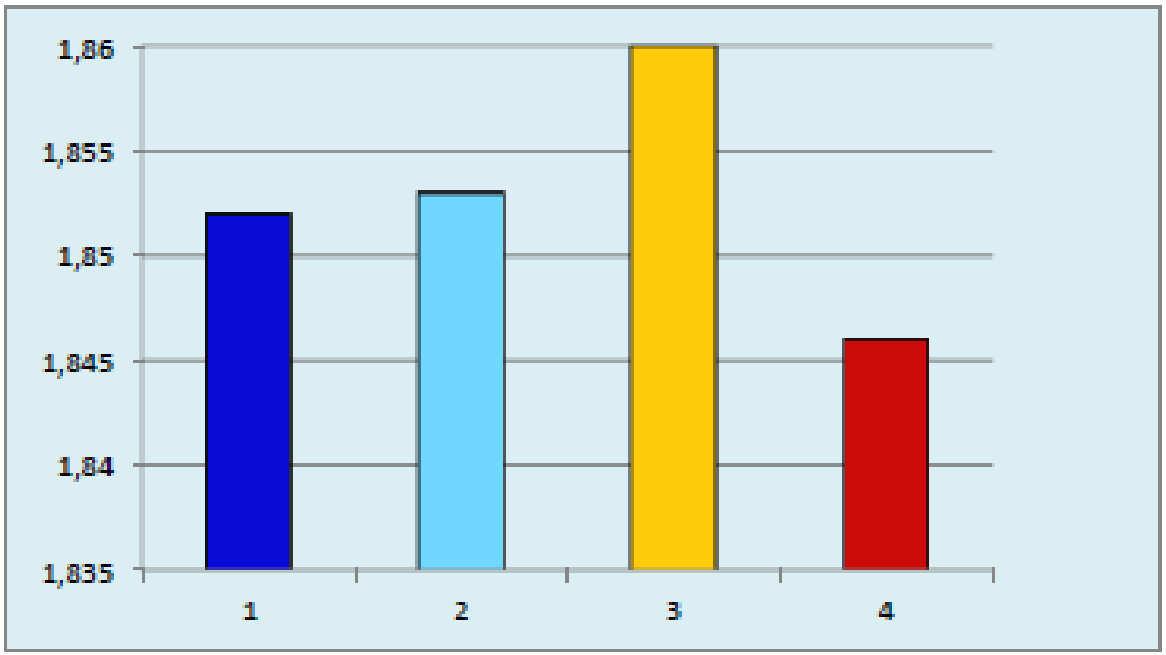
Reyna et. al. Avian Diseases Vol. 27 nb. 2, 1982

Productivity & interactions with environment.

Initial contamination (*E. acervulina)* Productivity at 44 days of age

- Litter and Drinkers

Feed conversion



A. M. Henken, 1994

1 - Equilibrium – 1.852

2- High challenge – 1.853

3- Low challenge - 1.860

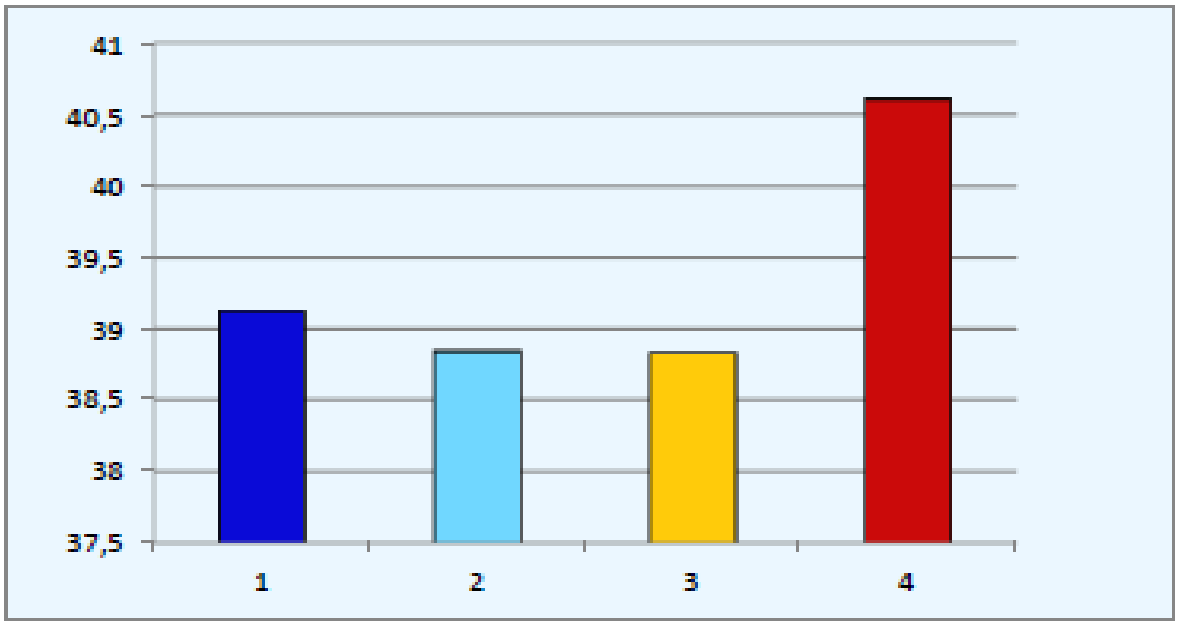
4- No challenge – 1.846

Productivity & interactions with environment.

Initial contamination (*E. acervulina)* Productivity at 44 days of age

- Litter and Drinkers

Daily weight gain- g.



A. M. Henken, 1994

1 - Equilibrium – 39.13 g.

2- High challenge – 38.84 g.

3- Low challenge – 38.83 g.

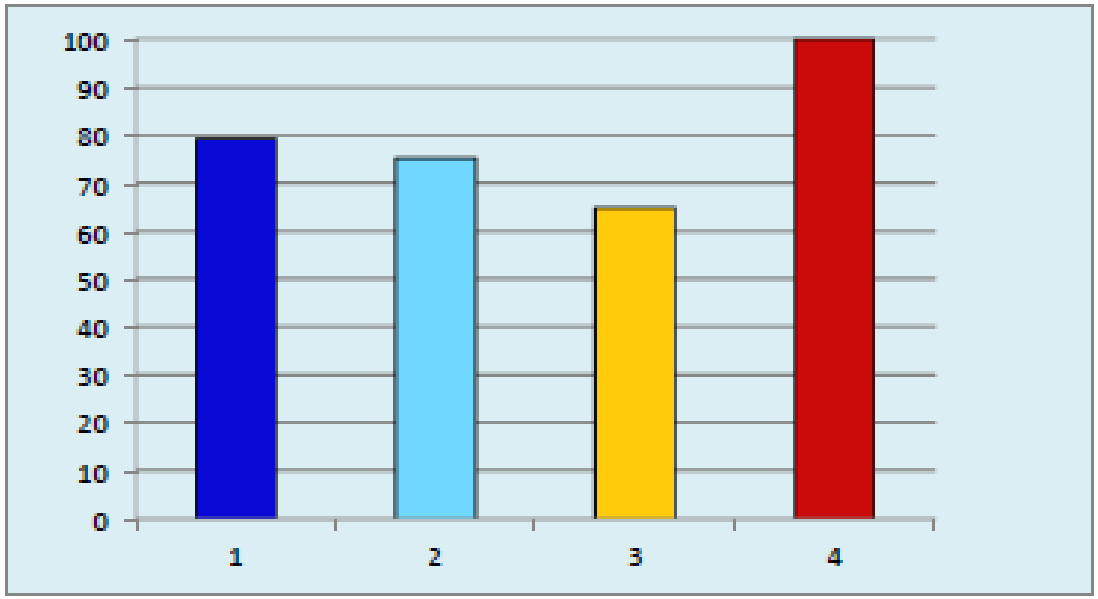
4- No challenge – 40.61 g.

Productivity & interactions with environment.

Initial contamination (*E. acervulina)* Productivity at 44 days of age

- Litter and Drinkers

Profitability $$$



A. M. Henken, 1994

1 - Equilibrium – 79.2%

2- High challenge – 75.2%

3- Low challenge – 64.9%

4- No challenge – 100%

MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

Most of those factors are related to:

- Poor husbandry: Litter and drinkers
- Improper nutrition/ poor feeding
- Stress / temperature
- Diseases

MAINTAINING A GOOD INTESTINAL HEALTH • Nutrition & feeding

Some usual feed additives can enhance bird response to intestinal challenge

Selenium and / or vitamin E bennefits on the mortality of birds challenged with *E. tenella* (4 studies)

Jensen, Johnson & Ruff, 1978
P.Science57: 1147

Se (ppm)	Vit. E (IU/Kg)	Study # - Mortality %			
		#1	#2	#3	#4
0	0	26	28	68	54
0,25	0	-	5	16	21
0,50	0	12	-	-	-
0	50	-	-	29	-
0,25	50	-	-	22	-

MAINTAINING A GOOD INTESTINAL HEALTH • Nutrition & feeding

Some usual feed ingredientes can worsen intestinal response to challenge

Response of birds fed corn or wheat based diets to *E. tenella* challenge

Ionophore	0 ppm	25 ppm	50 ppm	100 ppm	Mortality
Corn	13	0	5	0	4.5%
Wheat	43	20	25	5	23.2%

Willians, R.B. 1992 – Vet. Res. Com. 16: 147-152

- Nutrition & feeding

Poor quality ingredients such as corn contaminated with mold will decrease performance and drop imunity

Feed as a source of mycotoxins

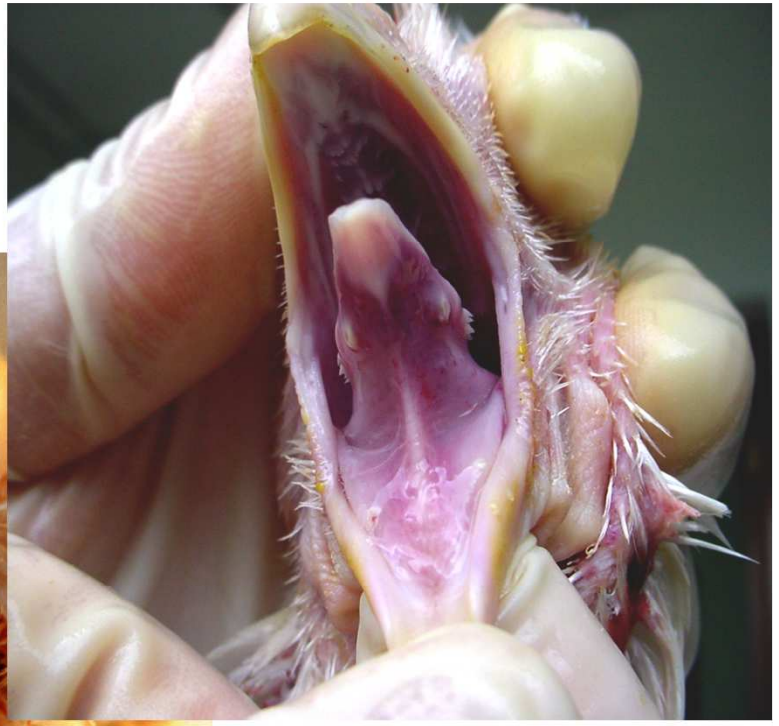
Aflatoxicosis (Bursa lesion)

- Nutrition & feeding

Mycotoxicosis

Muscle lesions

Tymus lesions



Oral lesions

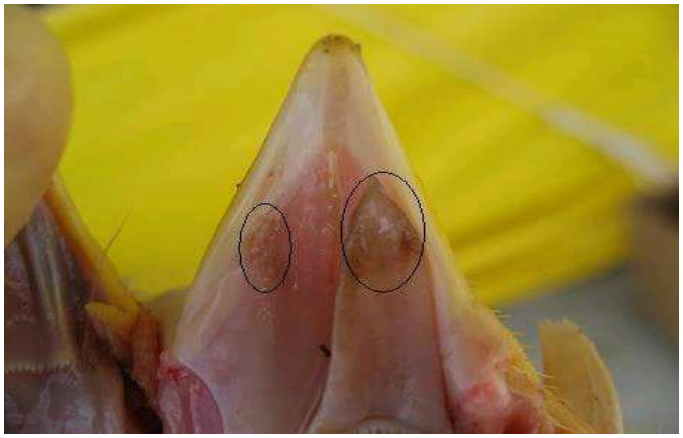
Myctoxicosis

- Nutrition & feeding

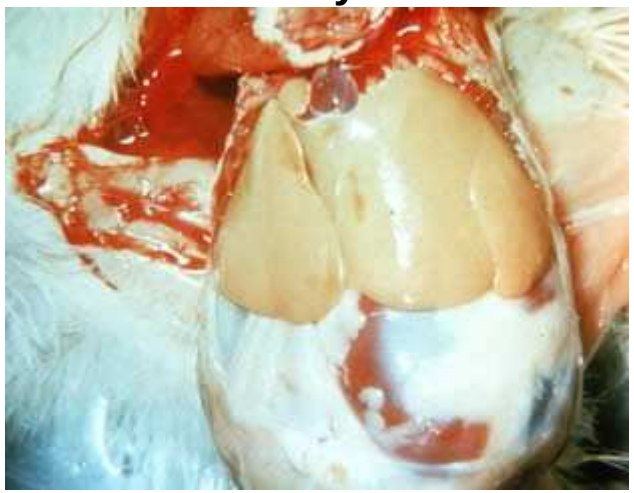
Hart lesions

Muscle lesions

Mouth lesions



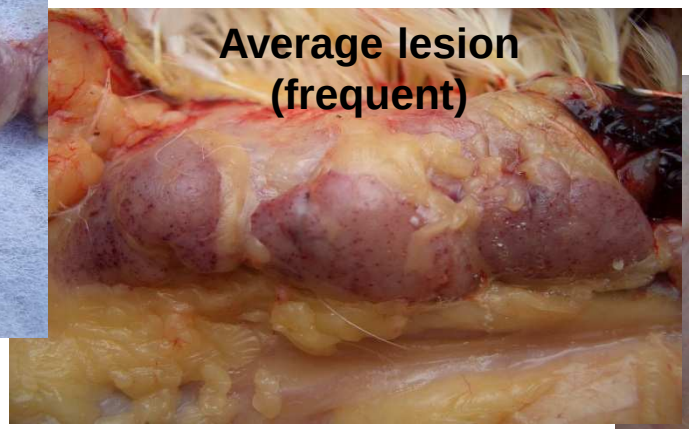
Fatty liver

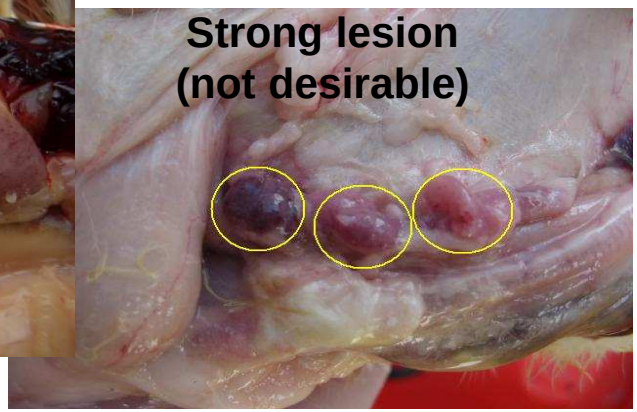


TYMUS

Mycotoxicosis

- Nutrition & feeding





Particle Size

Birds will be driven to eat more litter and less feed

Particle size (µ)	Feed consump. (g)
440	150[ab]
640	158[a]
780	150[ab]
870	146[ab]
970	141[b]

Krabbe (2000)

Feed of 7 day-old chicks

MAINTAINING A GOOD INTESTINAL HEALTH • Nutrition & feeding

Birds will be driven to eat more litter and less feed

Particle Size

MAINTAINING A GOOD INTESTINAL HEALTH

Feeder load

- Nutrition & feeding

Birds will be driven to eat more litter and less feed

MAINTAINING A GOOD INTESTINAL HEALTH • Nutrition & feeding

Feeder height

Birds will be driven to eat more litter and less feed

- Nutrition & feeding

Feeder height

Birds will be driven to eat more litter and less feed

MAINTAINING A GOOD INTESTINAL HEALTH

- Nutrition & feeding

Feeder height

MAINTAINING A GOOD INTESTINAL HEALTH

• Nutrition & feeding

Excess of litter in the guizard means less feed consumption and poor intestinal health.

MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

Most of those factors are related to:

- Poor husbandry: Litter and drinkers
- Improper nutrition/ poor quality feed
- Stress / temperature
- Diseases

MAINTAINING A GOOD INTESTINAL HEALTH • Stress / temperature

Heath Effect on Intestinal Bacteria

Duodenal flora of 4 week broilers under 25 & 35°C

	25°C	35°C
Streptococcus	3.3	6.09
Staphylococcus	2.73	6.21
Total Aerobics	4.01	6.72
Lactobacillus	7.25	6.96
Clostridium	**2.82**	**5.1**
Total Anaerobics	7.21	7.02

Bacteria count /g – log Suzuki et al,1983

MAINTAINING A GOOD INTESTINAL HEALTH

- Stress / temperature

MAINTAINING A GOOD INTESTINAL HEALTH

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MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

Most frequent intestinal diseases are:

- Necrotic enteritis
- Non specific enteritis / disbacteriosis
- Coccidiosis

MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

Two conditions are necessary for the development of **Necrotic Enteritis**:

- 1 - Presence of Intestinal lesions such as the ones caused by mild coccidiosis.
- 2 - Presence of *C. perfringens* population.
- All birds are subjectd to these two conditions in any prodution system.
- Cereals like wheat, oate and barley will favour the disease to develop.

MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

Effects of **Necrotic Enteritis**:

- Damage is caused by tissue necrosis and by the production of Alpha Toxin that besides destructing gut cells will enter the blood stream and afect the liver function.

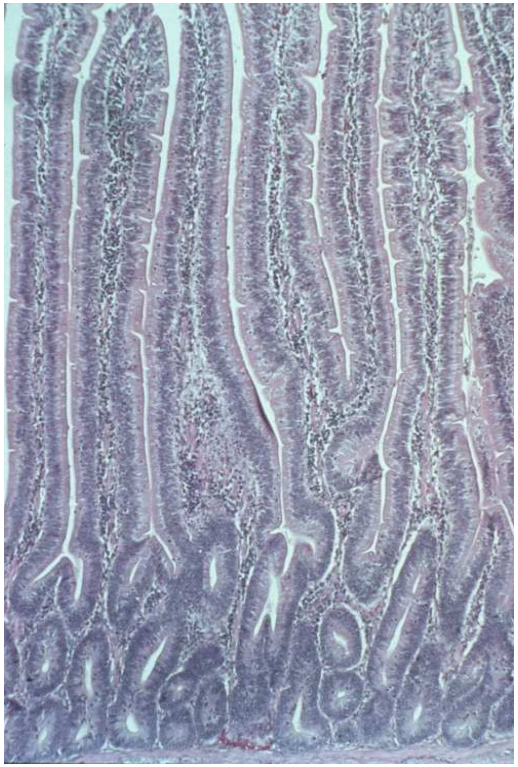
- Even when presented as a subclinical infection, damage on performance is significant.

- Control of NE requires good hygiene, good quality litter, good anticoccidial programs (*specially against E. maxima*) and use of approved Antibiotic Growth Enhancers (AGPs) to prevention or treatment.

MAINTAINING A GOOD INTESTINAL HEALTH

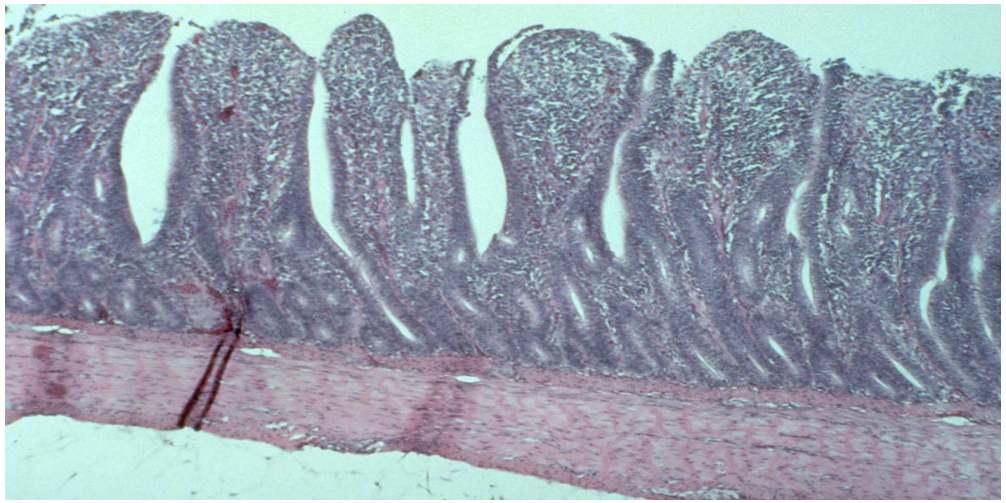
Controlling Factors that Lead to Poor Intestinal Health

Lesions of Necrotic Enteritis



Normal villi - fully functional

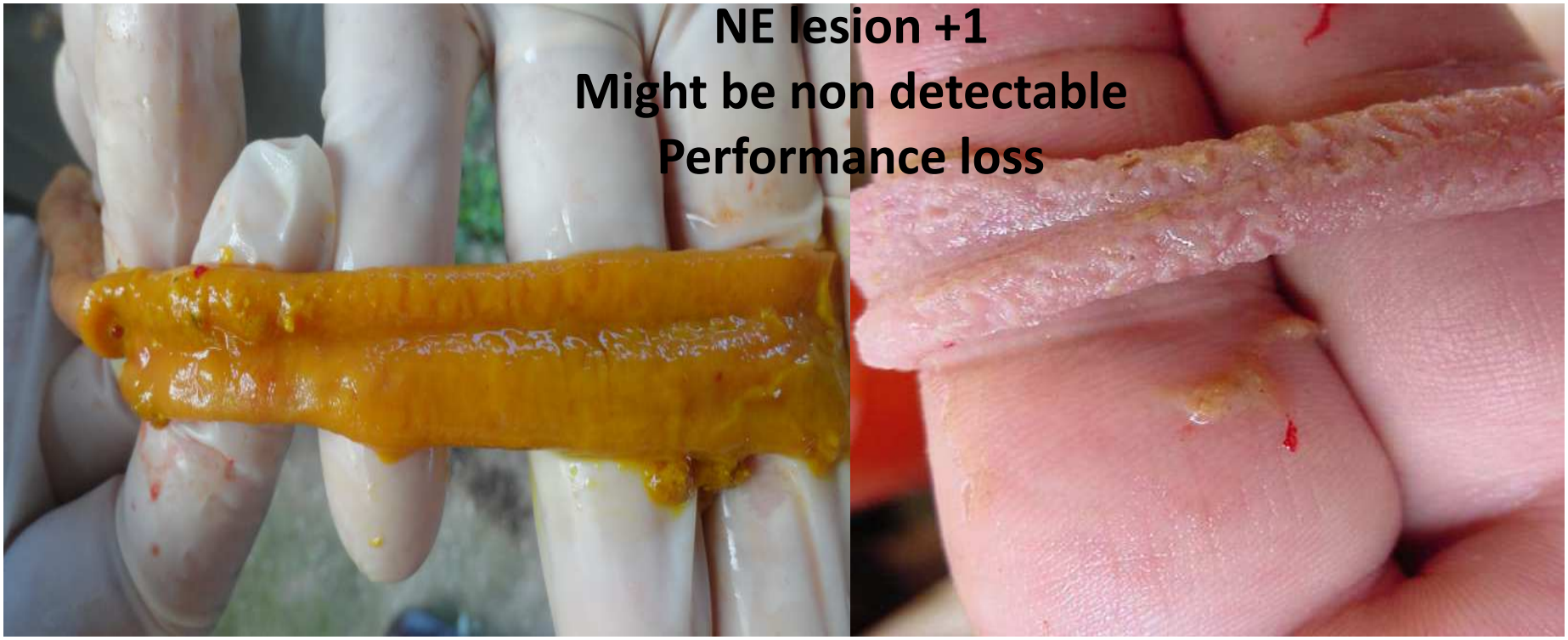
EN damaged villi – less absorption area



MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

Lesions of Necrotic Enteritis

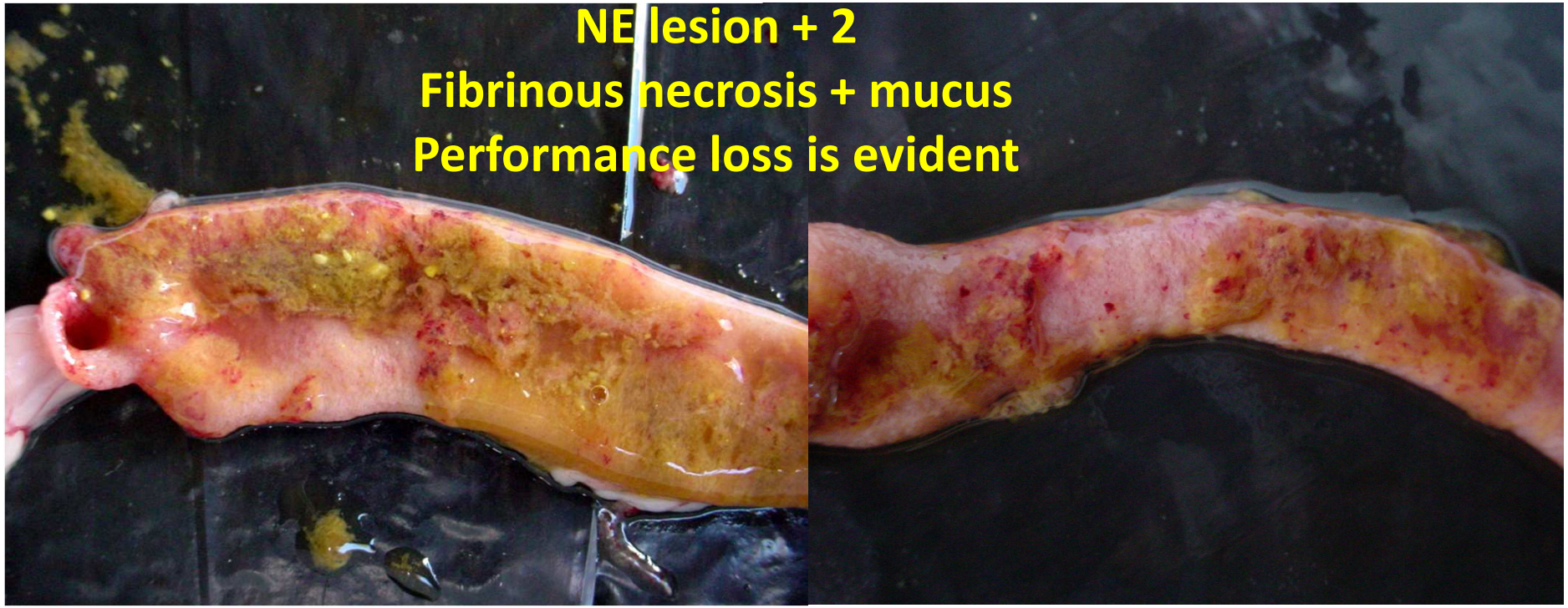


NE lesion +1
Might be non detectable
Performance loss

MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

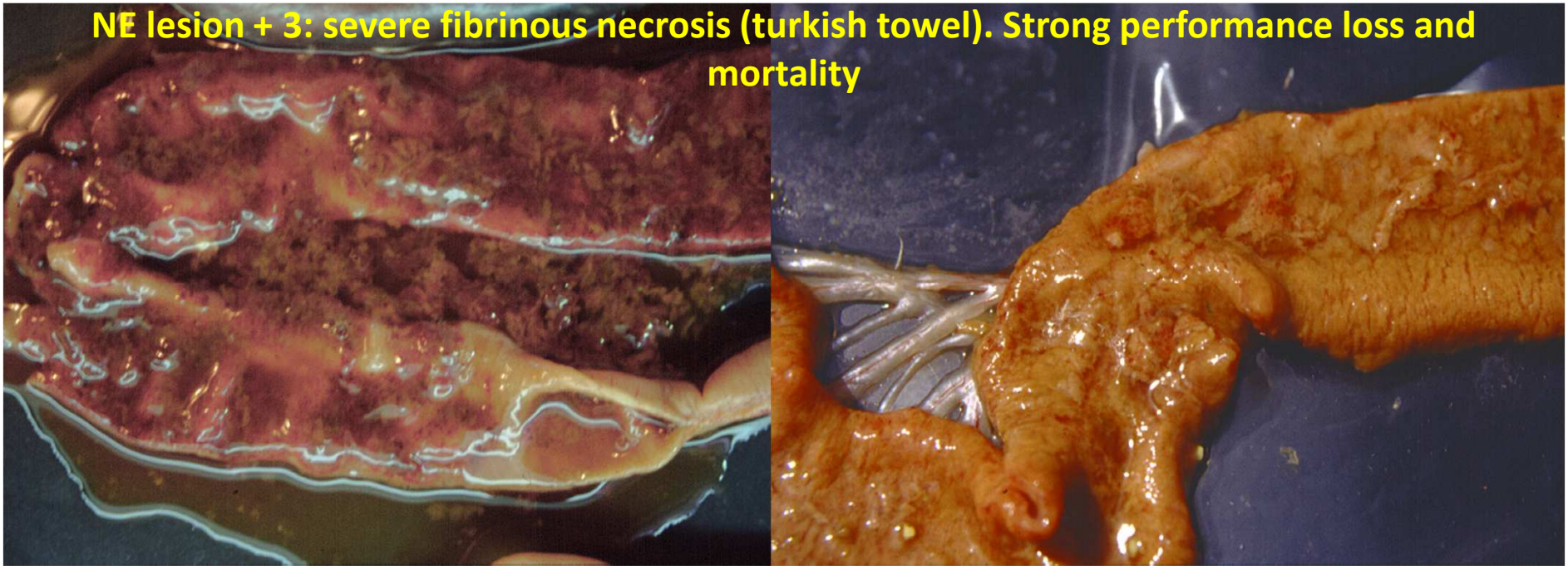
Lesions of Necrotic Enteritis



MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

Lesions of Necrotic Enteritis



MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

Virginiamycin for preventing and controling NE:

- Authorised throughout the world: India, USA, Brazil, Canada, Australia, Russia, Japan and many others.
- Works only in the intestines. Same 20 ppm dose works as AGP and to prevenmt & control enteritis.
- Non absorbible AGP: no residue in eggs, milk or meat.
- Has European MRL.
- Narrow spectrum. Does not affect the intestinal flora.
- Originated from a micro organism usualy found in soil.

MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

MIC of Virginiamycin and other drugs against *C. Perfringens*

Lower figures mean higher efficacy

Poultry Science 63:2036-2042

Antimicrobial	MIC (ppm)
Bacitracin	3.10
Penicillin	0.20
Oxitetracyclin	0.05
Eritromycin	3.10
Tylosin	0.78
Flavomycin	>100
Lincomycin	1.60
Estreptomycin	>100
Virginiamycin	**0.02**

VIRGINIAMYCIN MANUFACTRURING

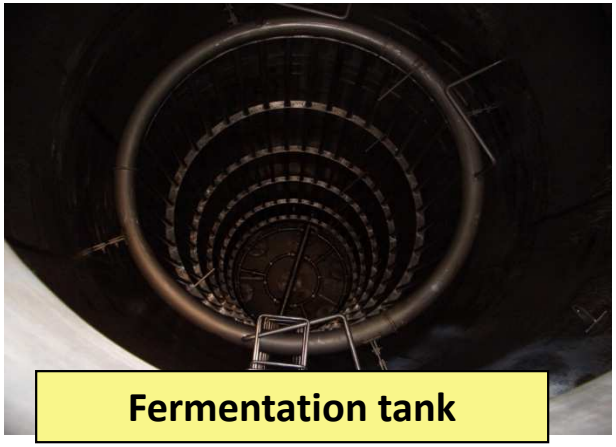
Streptomyces virginiae **culture**

First step fermentation in mini-jars

Multiplication / Fermentation in large stainless steel tanks

VIRGINIAMYCIN MANUFACTRURING

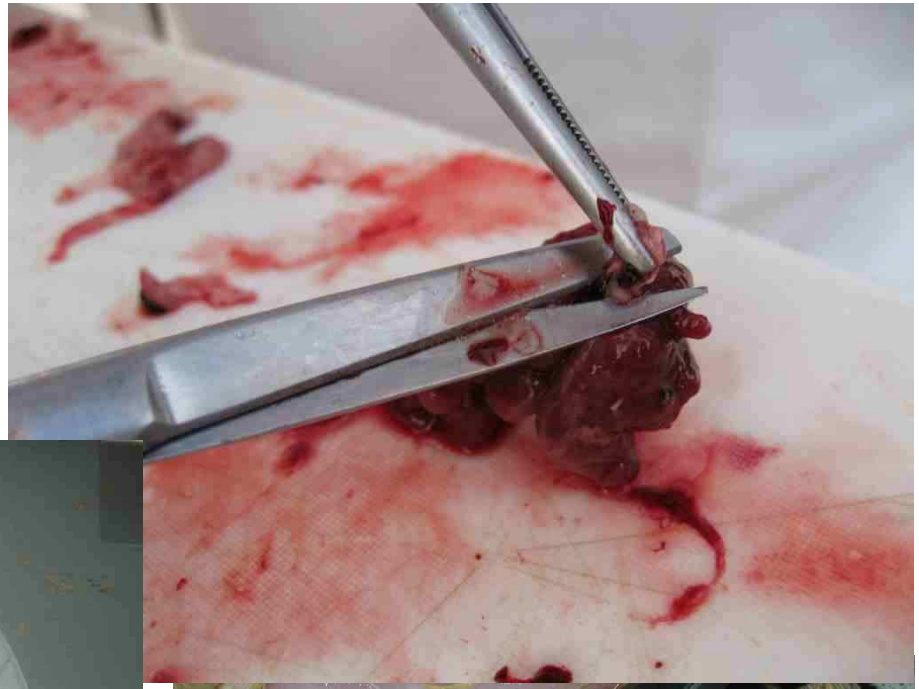
Fermentation plant



Fermentation tank

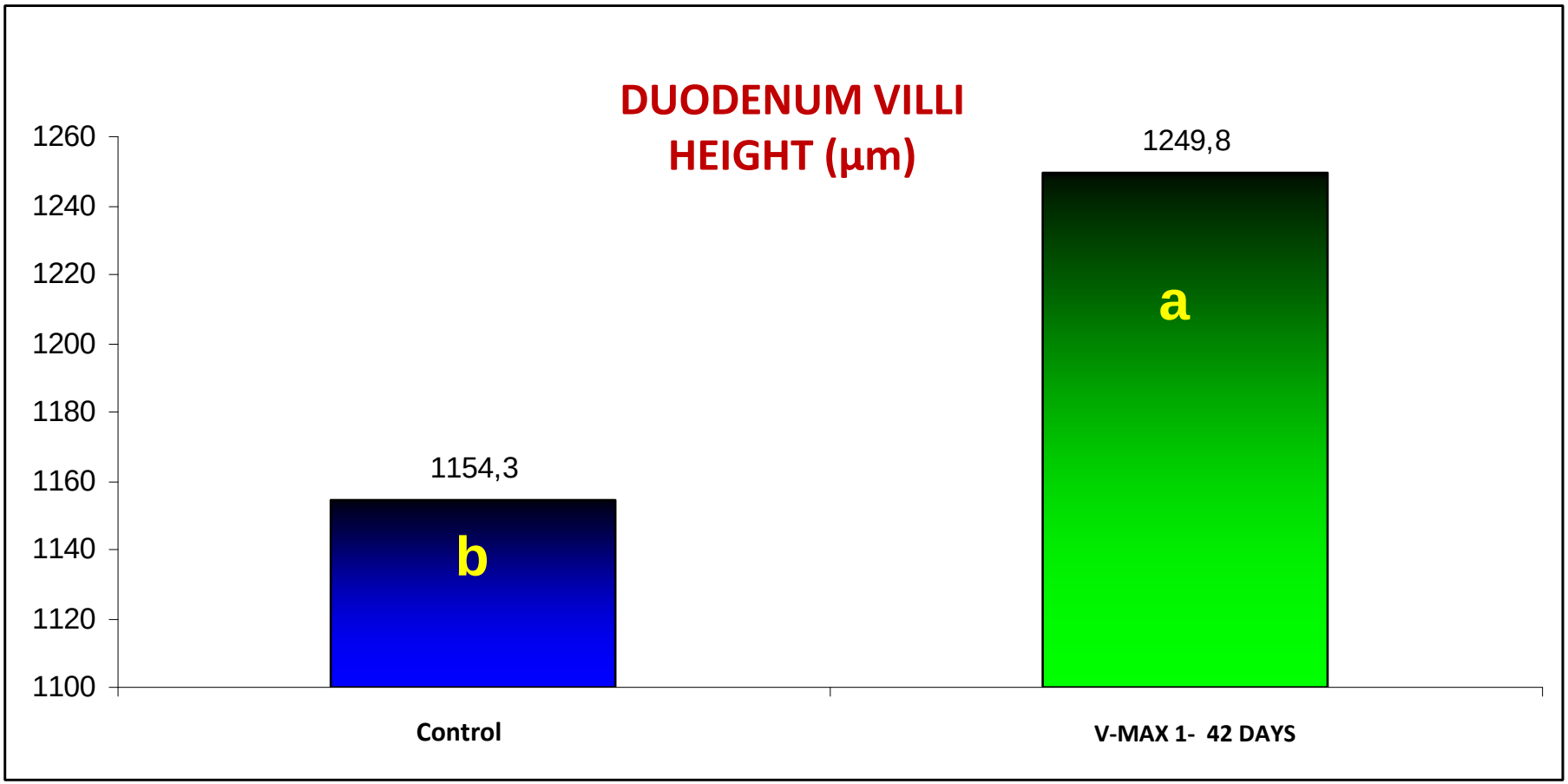
Final step: plant for purification and standartization of VM

Residue depletion study of Virginiamycin in broilers



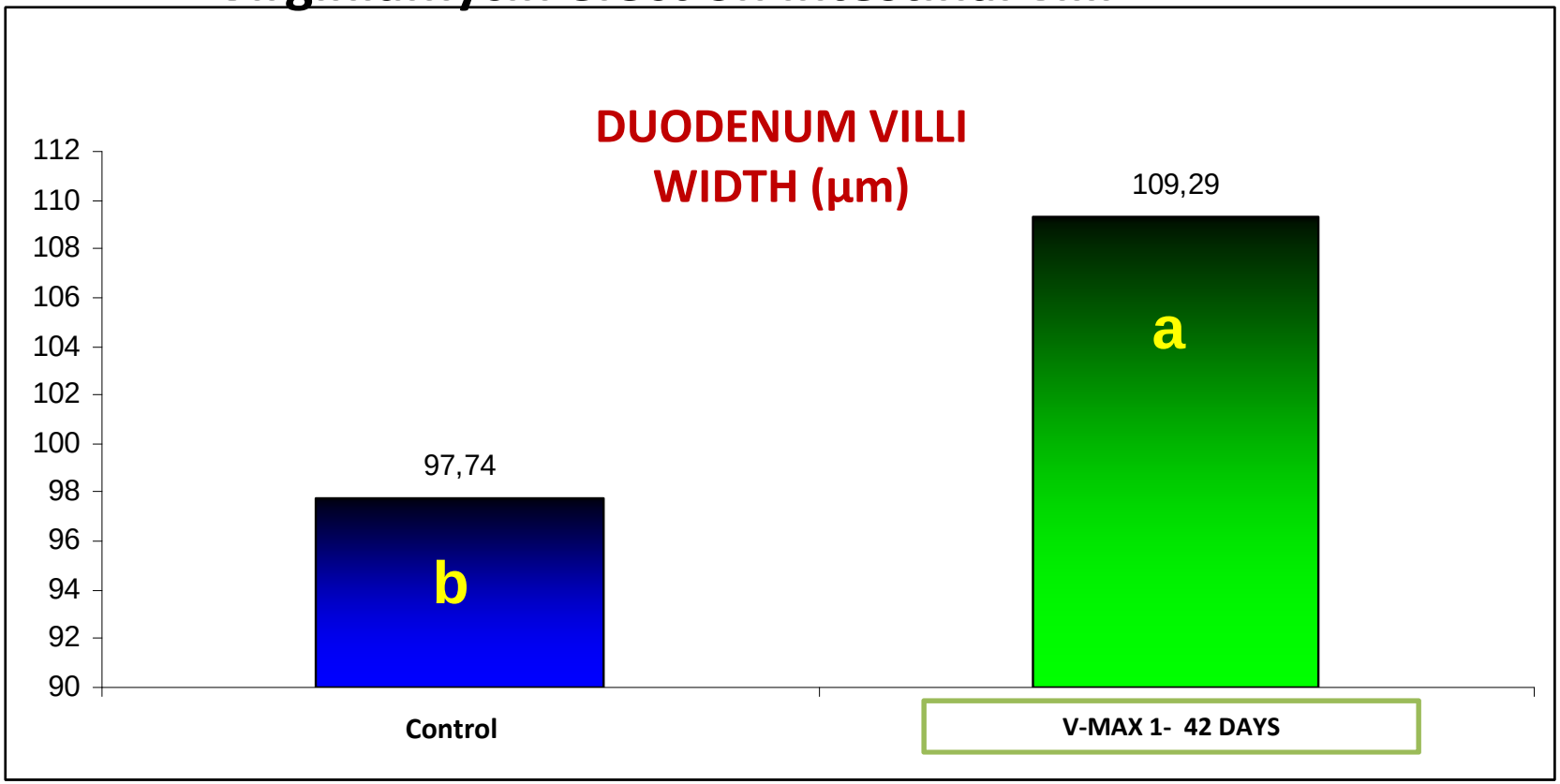
Residue depletion study in eggs

Virginiamycin efect on intestinal villi



Study carried out in Brazil, 2011

Virginiamycin efect on intestinal villi



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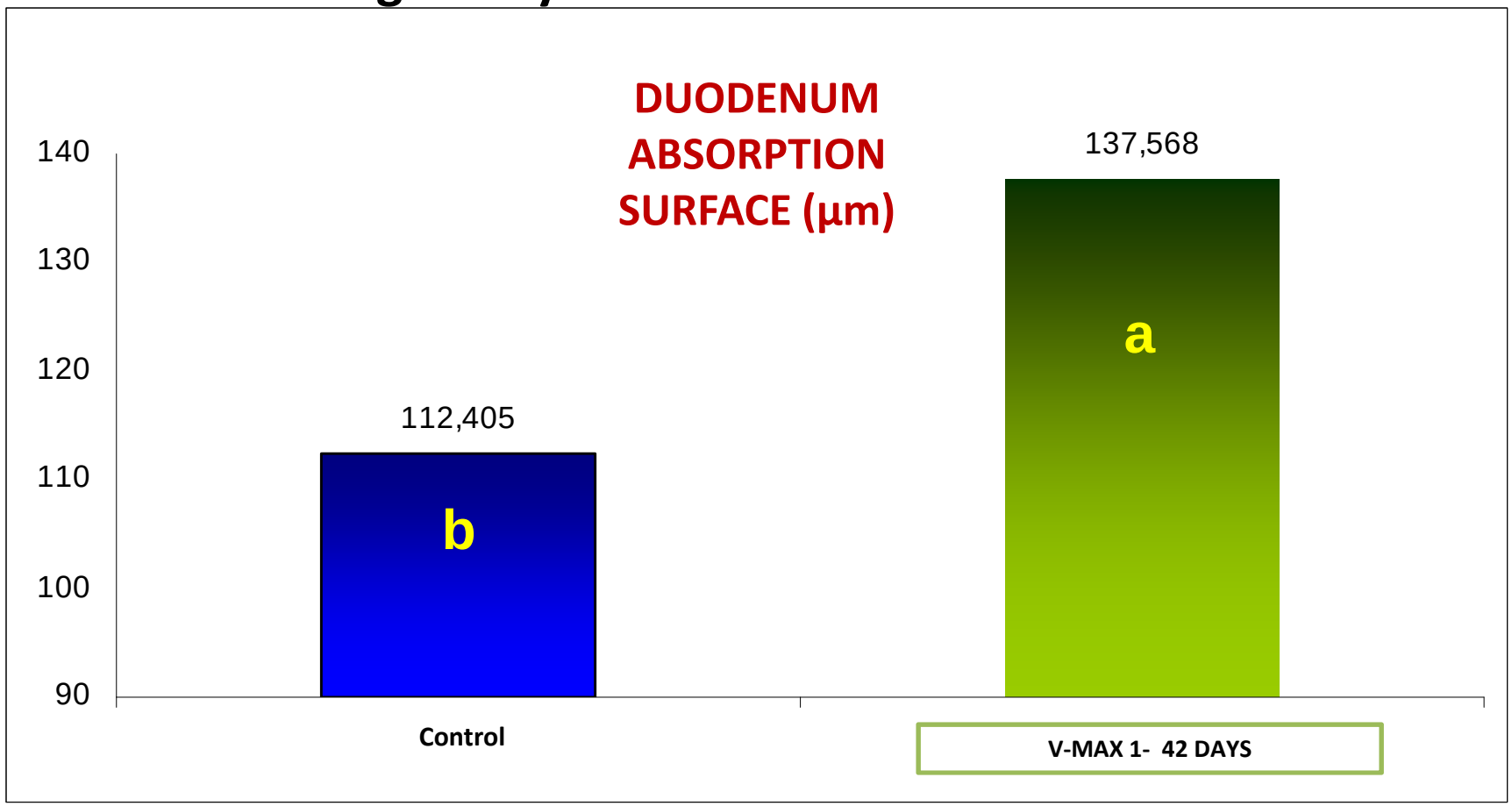
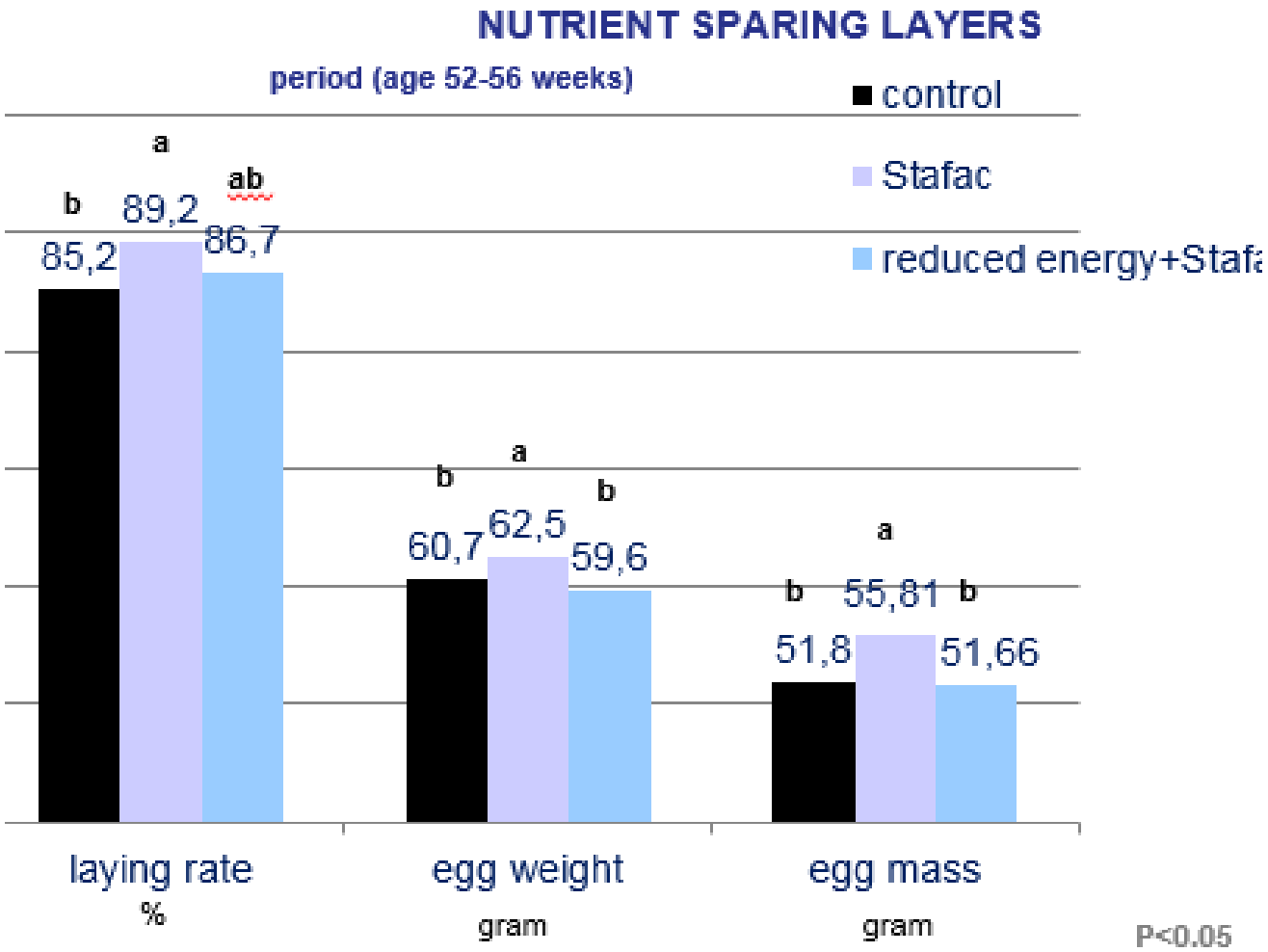


Study carried out in Brazil, 2011

Virginiamycin sparing



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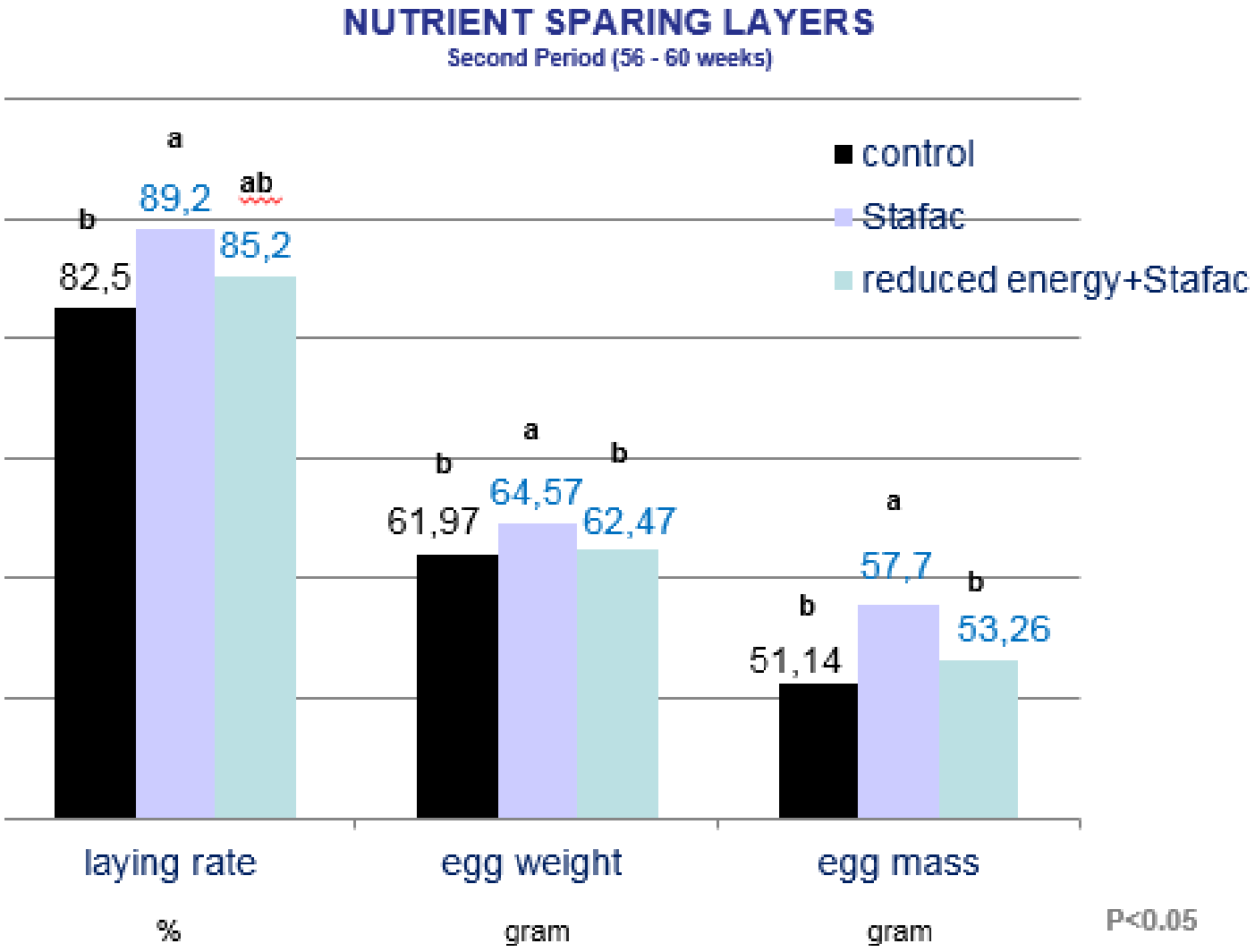
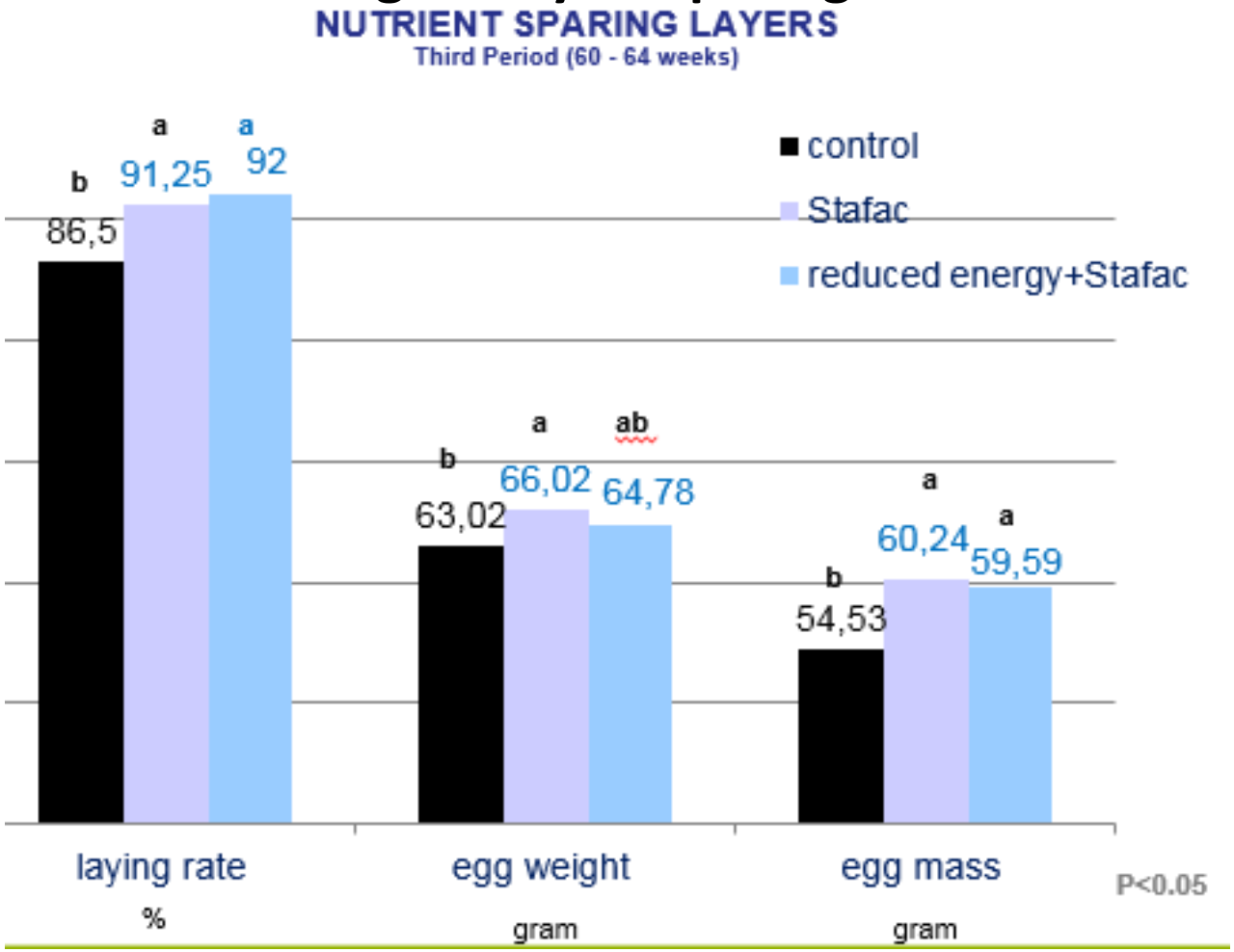
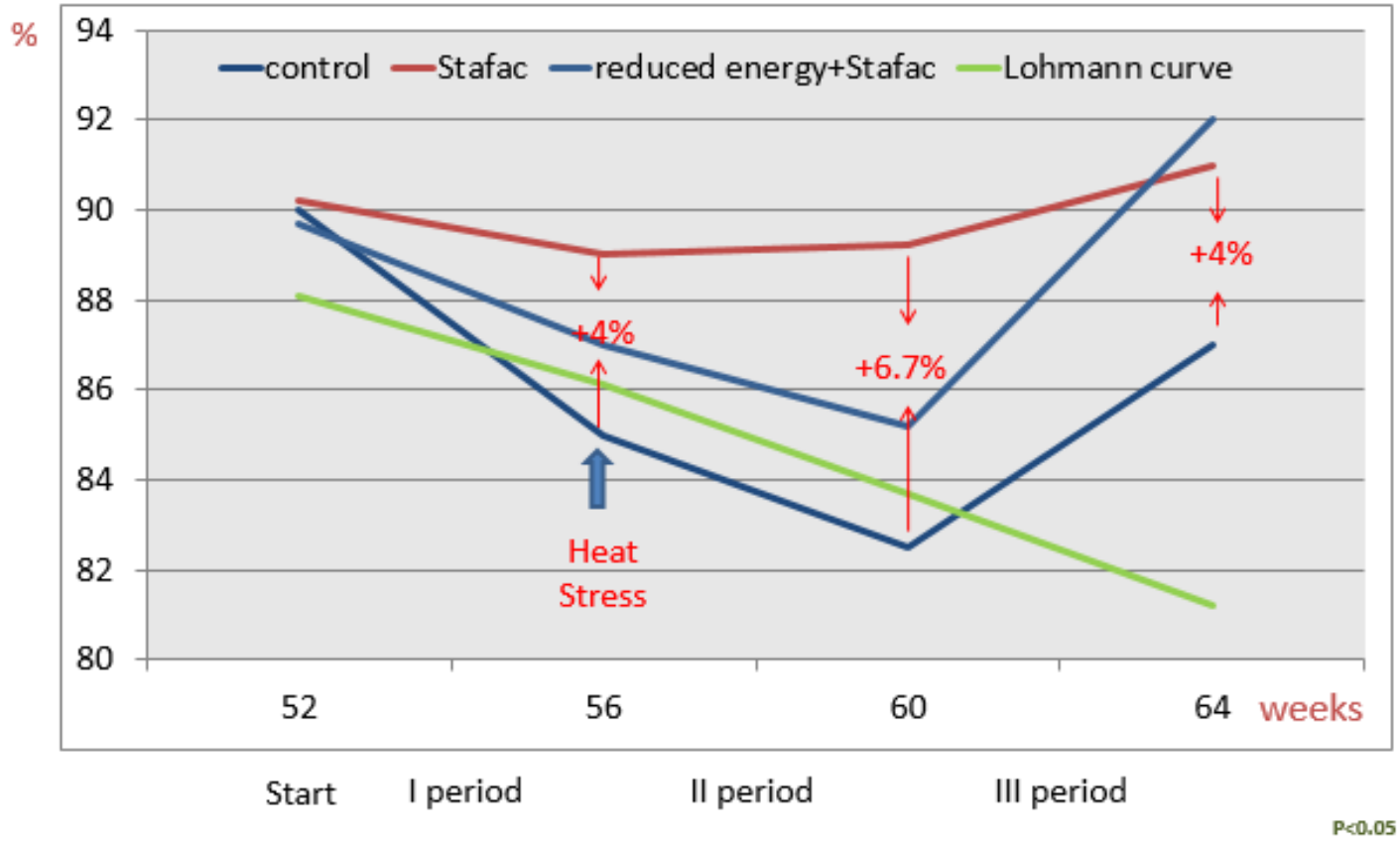


Virginiamycin sparing



VIRGINIAMYCIN IN PREVENTING HEAT STRESS IN LAYERS

Laying rate



MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

Most frequent intestinal diseases are:

- Necrotic enteritis
- Non specific enteritis / disbacteriosis
- Coccidiosis

MAINTAINING A GOOD INTESTINAL HEALTH

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Effects of Non Specific enteritis

- Some damage –not as NE- but no risk of mortality
- May be caused by a number of agentes: rancid fat, mycotoxins, feed restriction.
- No specific organismo is involved.
- Most common in fast growing broilers
- Although not a serious threat, is a concern in many companies

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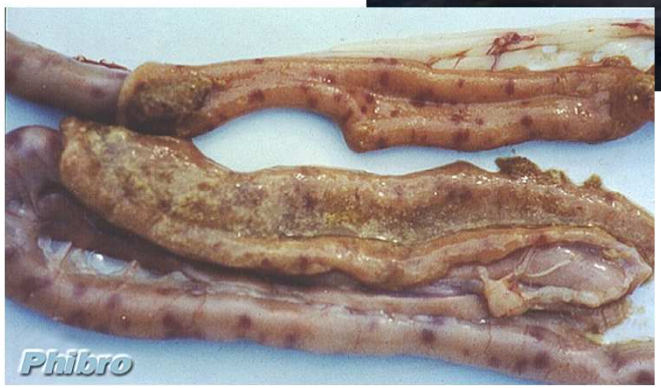
Some lesions of Non Specific enteritis







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- Coccidiosis

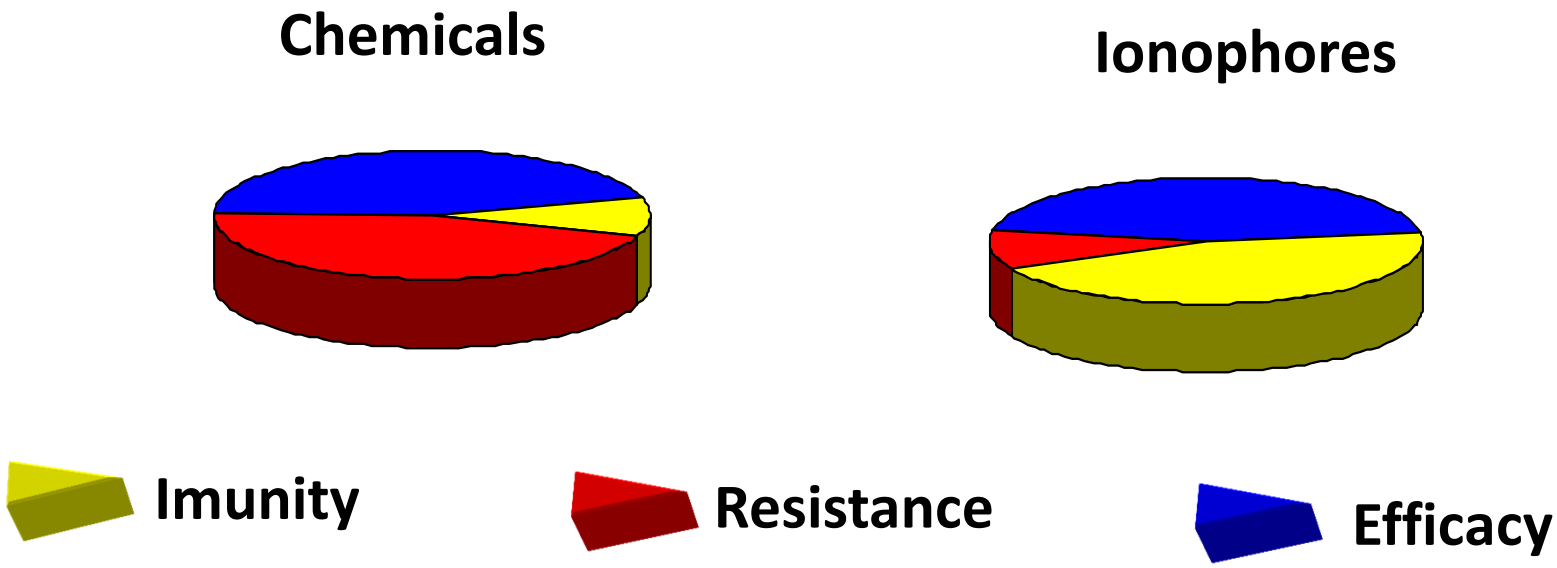
MAINTAINING A GOOD INTESTINAL HEALTH

Main Eimeria species chacteristics

	Oocyst Production	Imunity	Mortality / loss $
E. acervulina	✚✚✚✚✚	✚✚	(-) / ✚✚✚✚
E. maxima	✚	✚✚✚✚✚	✚✚ / ✚✚✚✚✚
E. tenella	✚✚✚	✚	✚✚✚✚✚ / ✚✚
E. necatrix	◤	◤	✚✚✚✚✚ / ✚✚✚✚✚

MAINTAINING A GOOD INTESTINAL HEALTH

Theoretical Field Performance of Chemical and ionphore Anticoccidials



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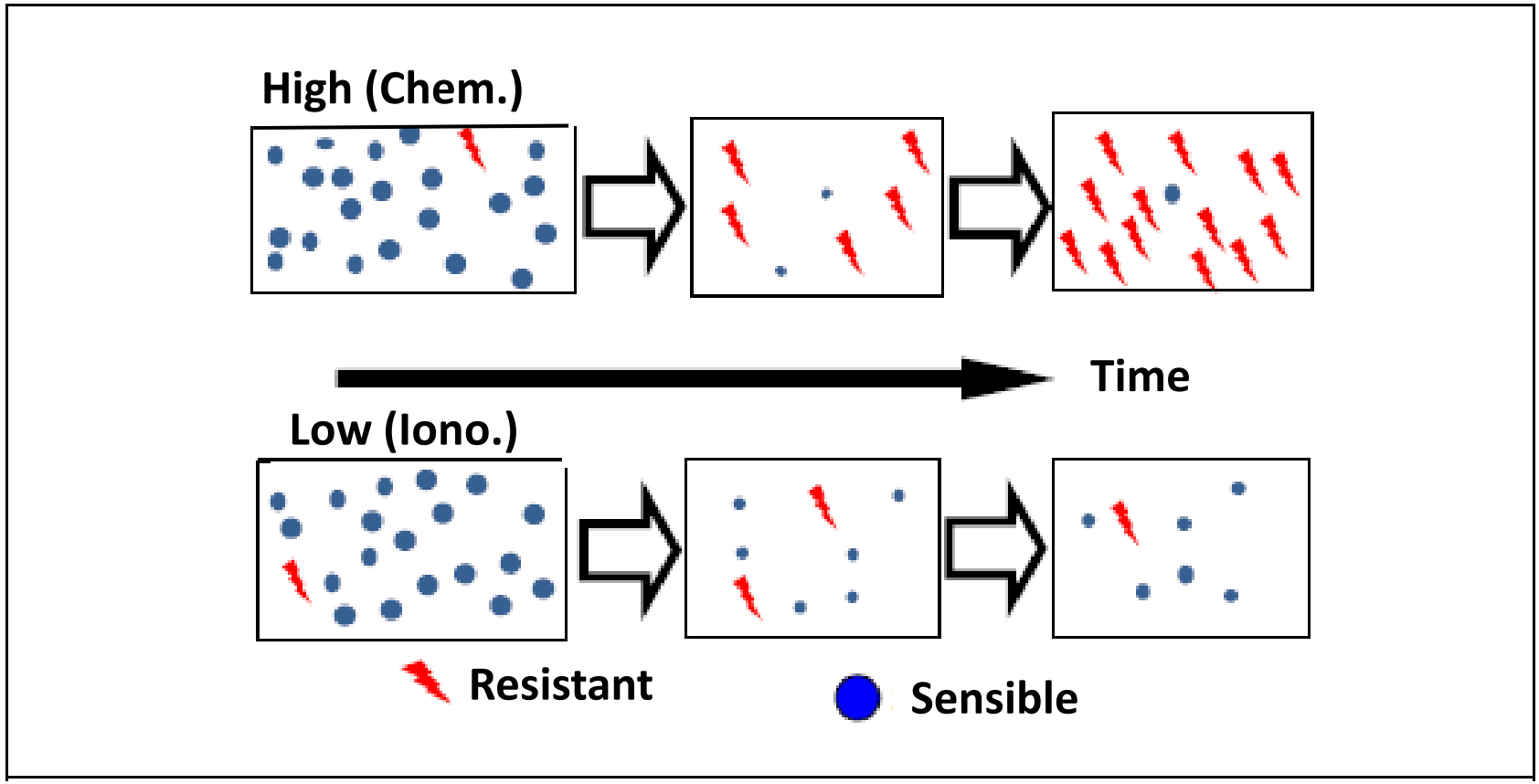
Pressure Selection of Anticoccidials



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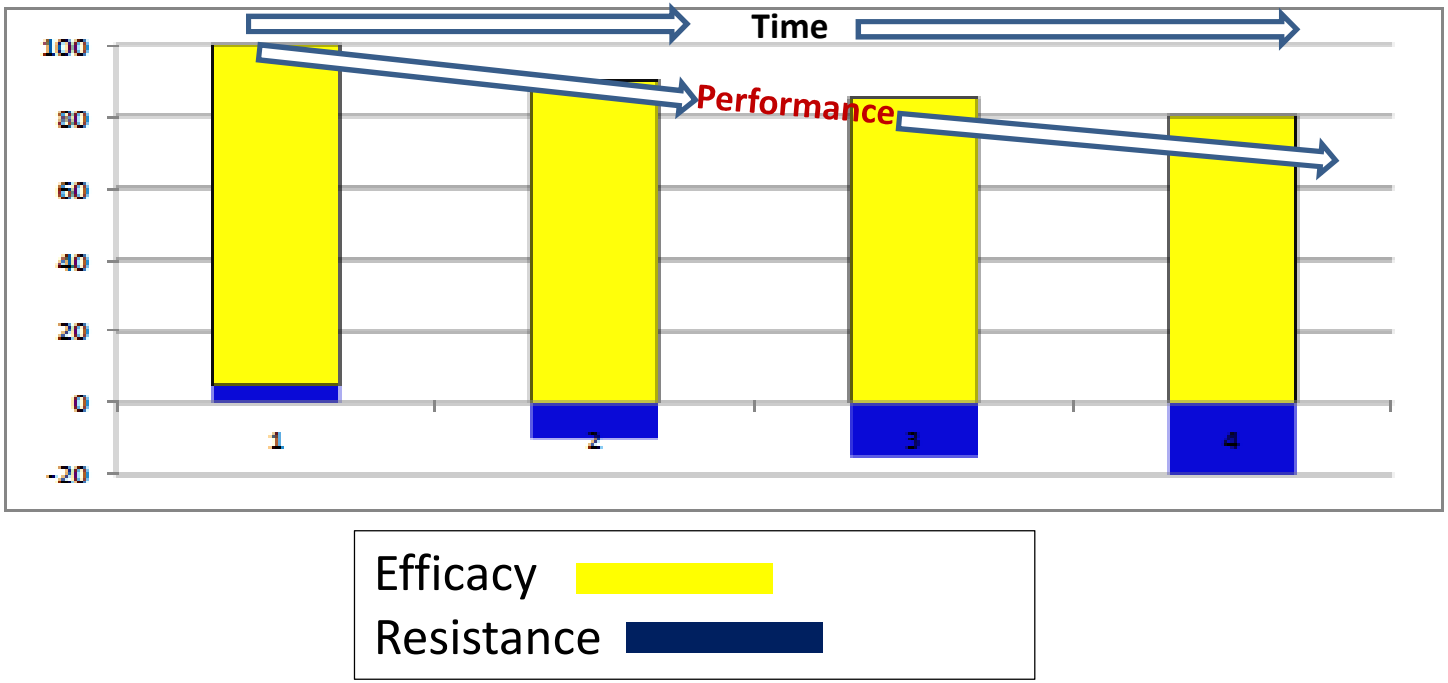
"VERTICAL" ANTICOCCIDIAL: Highly potent



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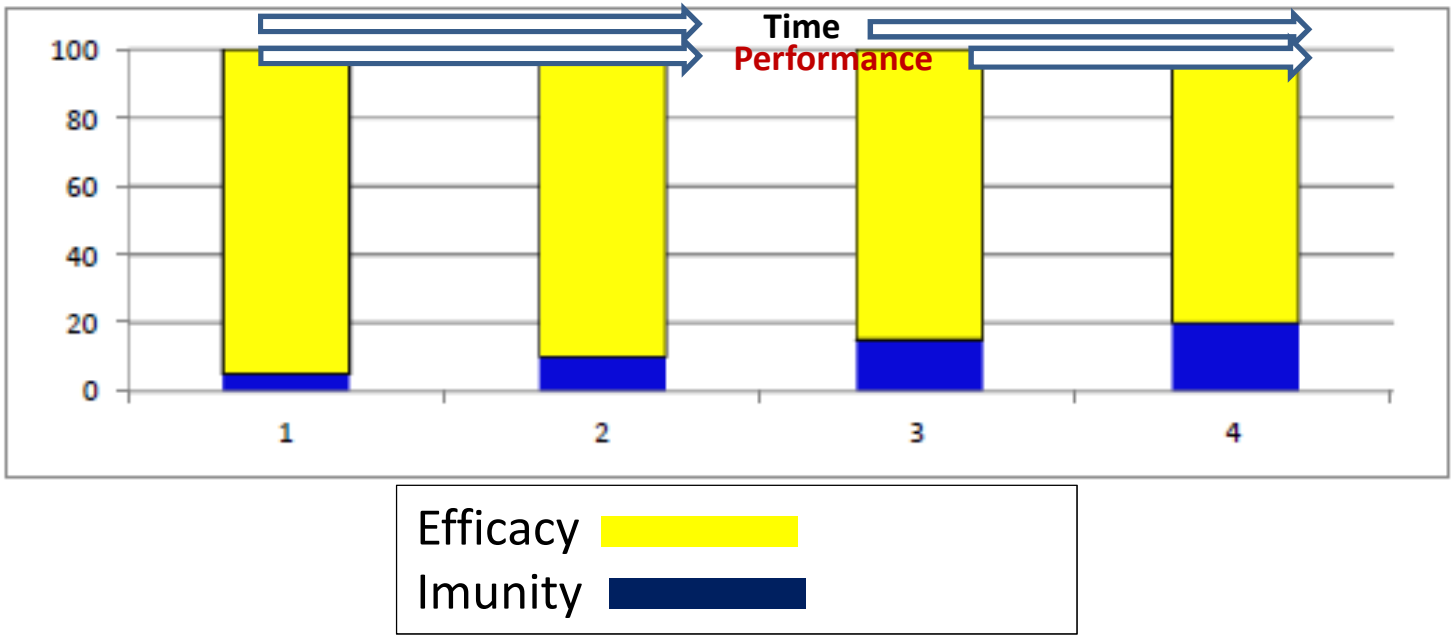
"HORIZONTAL" ANTICOCCIDIAL: AVERAGE POTENCY



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MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

SOME FIELD PRACTICES IN LATIN AMERICA

- Both tunel and open sided houses are usually profitable

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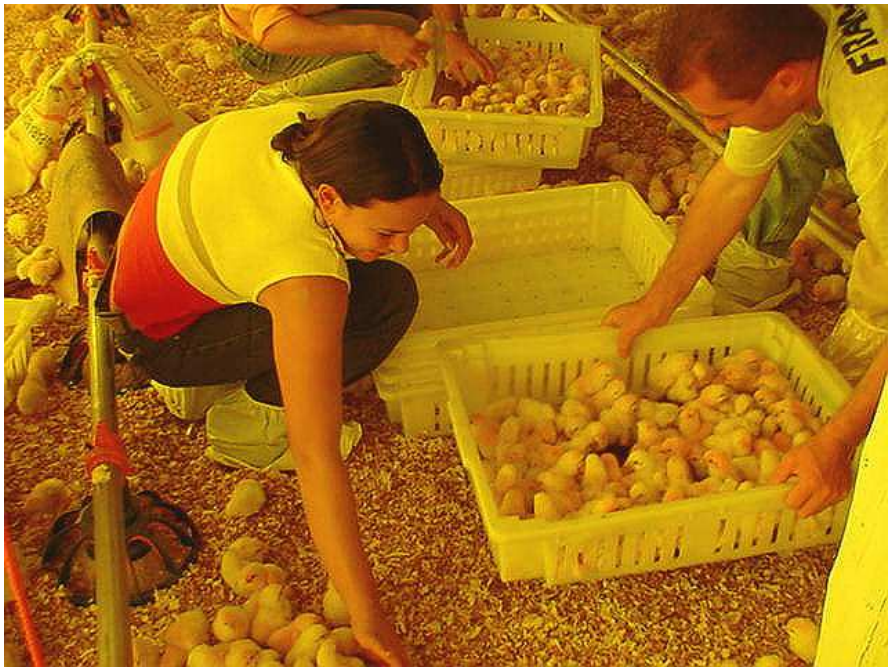
SOME FIELD PRACTICES IN LATIN AMERICA

Baby chicks quicly delivered and placed one by one



MAINTAINING A GOOD INTESTINAL HEALTH

Controlling Factors that Lead to Poor Intestinal Health

SOME FIELD PRACTICES IN LATIN AMERICA

- Baby chicks are tought to drink and eat just after arrival

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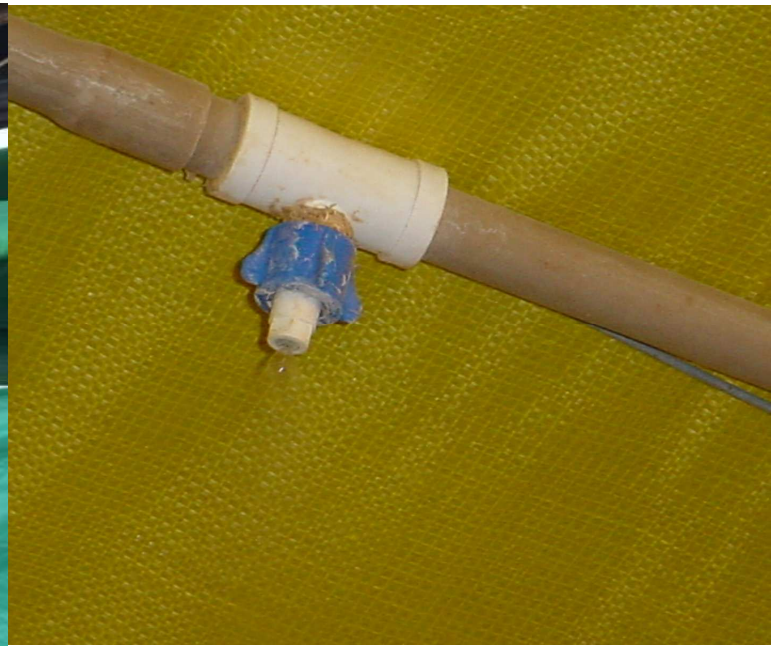
SOME FIELD PRACTICES IN LATIN AMERICA

Use of false ceiling and cheap ventilation systems are encouraged



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SOME FIELD PRACTICES IN LATIN AMERICA

Trees are planted by farmers and used for heating the houses along with gas

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SOME FIELD PRACTICES IN LATIN AMERICA

Wooden heaters don´t send fumes inside the house

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SOME FIELD PRACTICES IN LATIN AMERICA

Birds are harvested preferably at night

MAINTAINING A GOOD INTESTINAL HEALTH

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SOME FIELD PRACTICES IN LATIN AMERICA

Birds are placed in boxes one by one – no bruises

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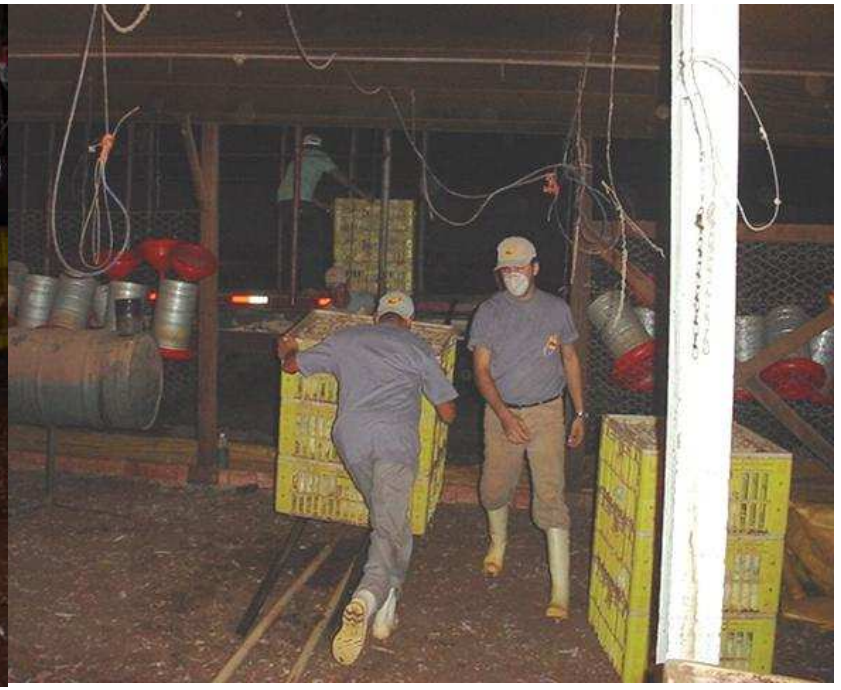
SOME FIELD PRACTICES IN LATIN AMERICA

Boxes run over plastic and metal tubes to the trucks.



MAINTAINING A GOOD INTESTINAL HEALTH

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SOME FIELD PRACTICES IN LATIN AMERICA

Each three boxes + birds weight typically 60 kg.

Farmer works along with his employees

MAINTAINING A GOOD INTESTINAL HEALTH

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SOME FIELD PRACTICES IN LATIN AMERICA

Trucks size is standard and not too big

Feed mill, hatchery and slaughtering are usualy less than 80 km from farms

MAINTAINING A GOOD INTESTINAL HEALTH

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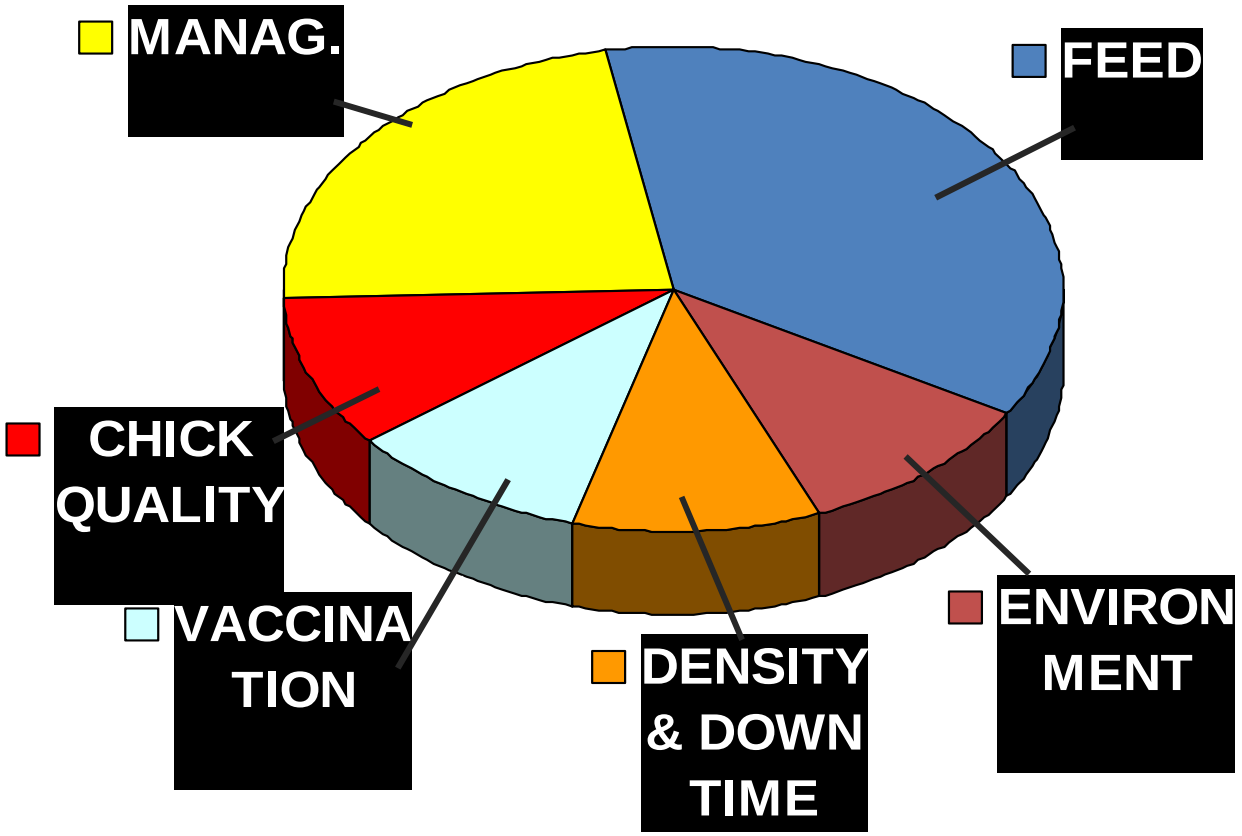
SOME FIELD PRACTICES IN LATIN AMERICA

Field monitoring and practical training to company teams is a routine

MAINTAINING A GOOD INTESTINAL HEALTH

Significant aspects on broiler performance



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CONCLUSION

- Modern automated equipments and tunnel ventilation houses are good but...
- The Three Main Aspects for successful results are **careful husbandry**, **quality food**, **environment control**. They are applicable to any environment.
- But don´t forget the remaining three aspects: vaccination, density & downtime and chick quality.
- Non sofisticated operations are quite successful when these rules are followed.
- Train your team constantly, be creative and COUNT ON US.


Thank you!
Cesar.lopes@pahc.com