

**Is Embryo Pre-Emergent
Nutrient Reserves and
Chick Feed at Hatch
Satisfactory?**

**Edwin T. Moran, Jr.
Poultry Science Department
Auburn University AL USA**

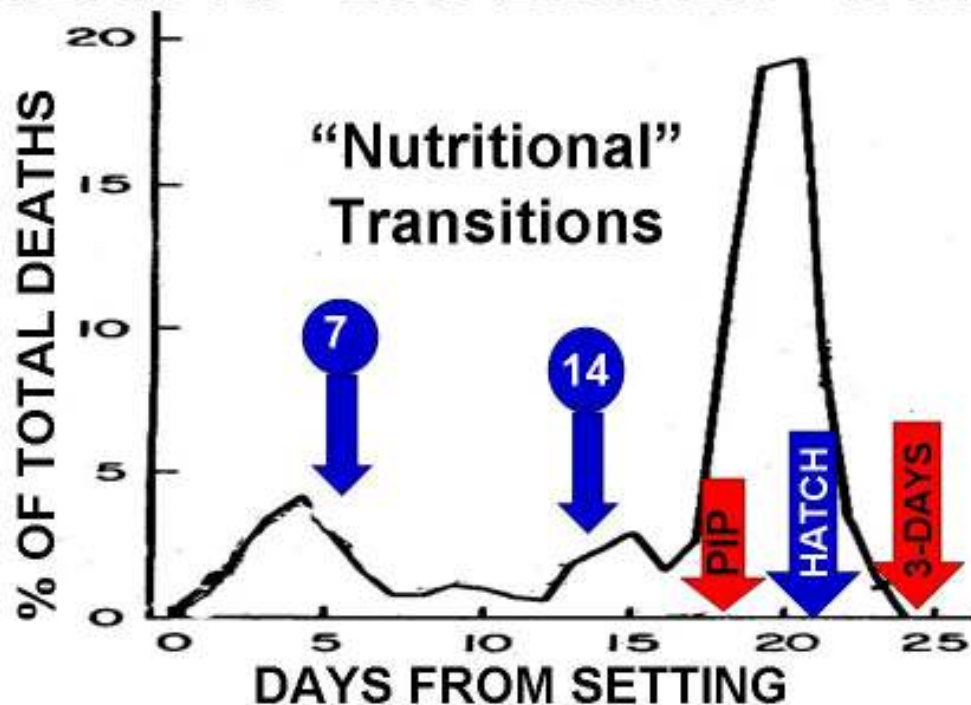
**NUTRIENTS- CRITICAL &
EXPENSIVE**

**Protein
Energy
Phosphorus**

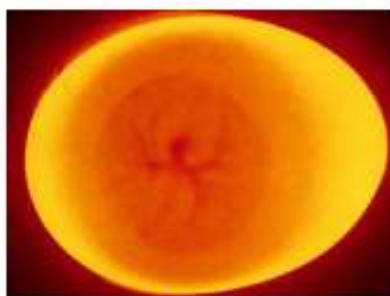
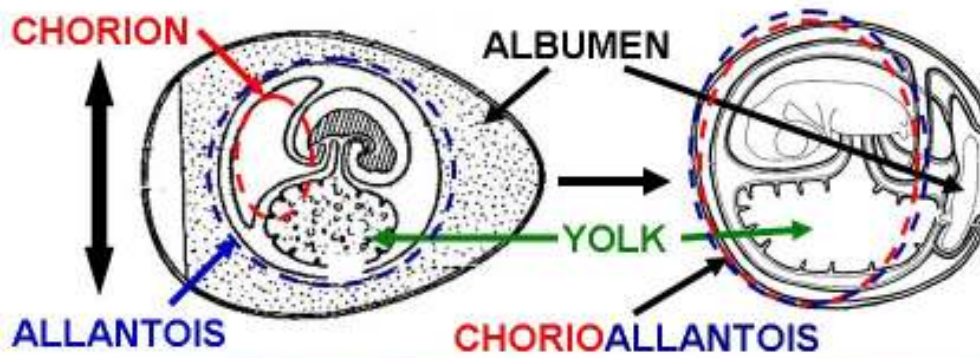
YOUNG VS OLD BREEDER EGGS

	<u>25</u>	<u>65</u>	<u>SEM</u>	<u>P<</u>
g Egg Wt	47.2	69.2	0.75	***
% Yolk	27.5	34.5	0.45	***
% Albumen	30.0	39.5	0.61	***
% Shell	9.0	8.6	0.12	*
g Chick Wt	33	46	0.1	***

GERM TO "ESTABLISHED" CHICK



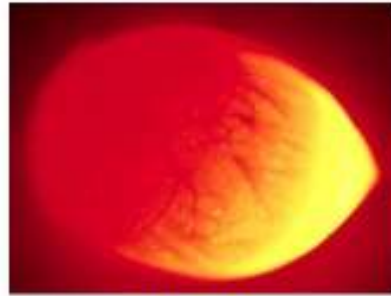
GERM & TRANSITION TO OXYGEN



5 DAYS



"CANDLE"

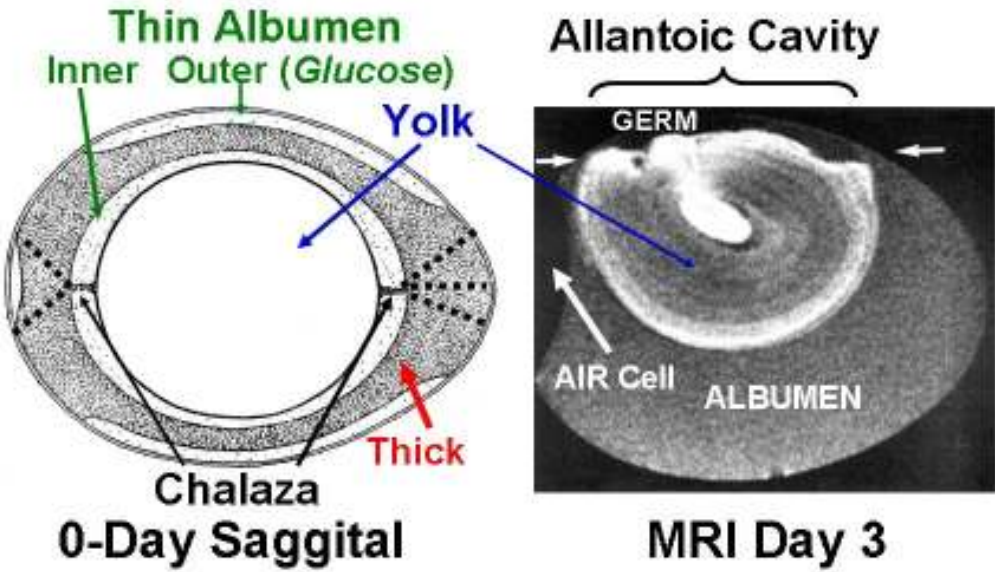


8 DAYS

SETTING HEN – TURNING EGGS



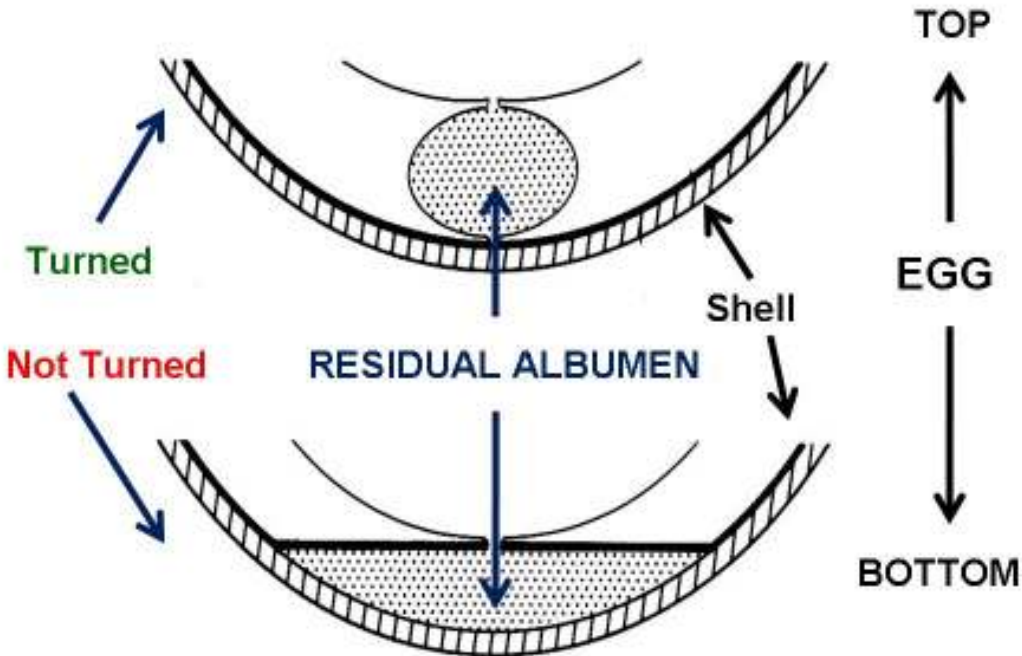
EGG STRUCTURE & EARLY INCUBATION



Romanoff & Romanoff, 1949

Falen et al., 1981

EARLY INCUBATION & ALBUMEN LOCATION



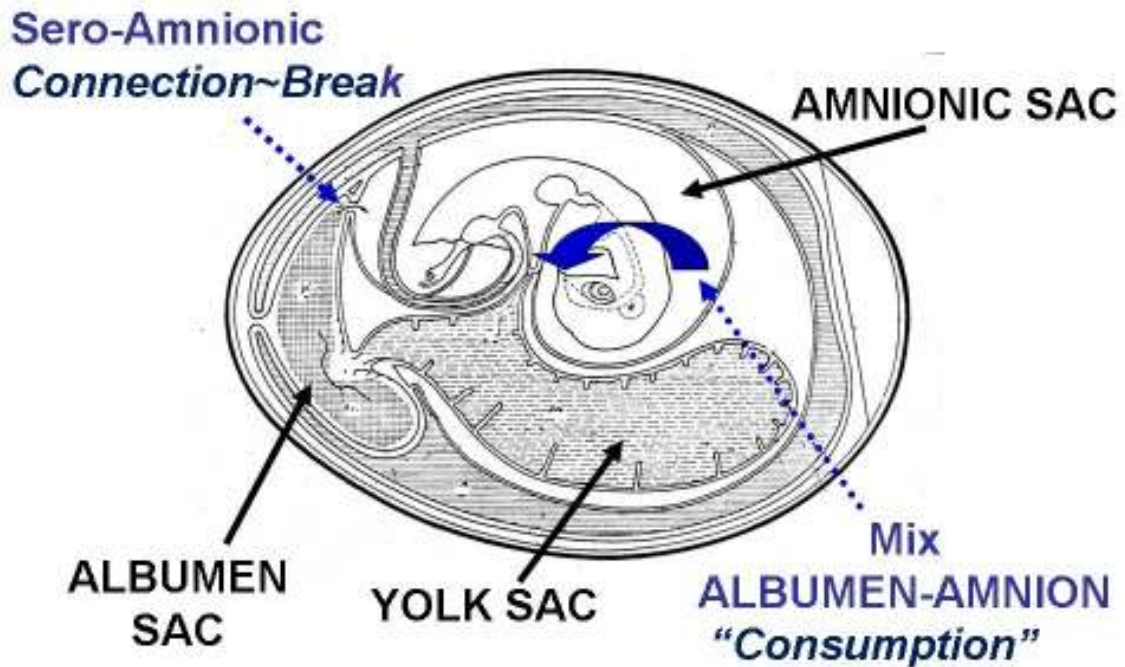
Tullet and Deeming, 1987

GERM TO "COMPLETE" EMBRYO

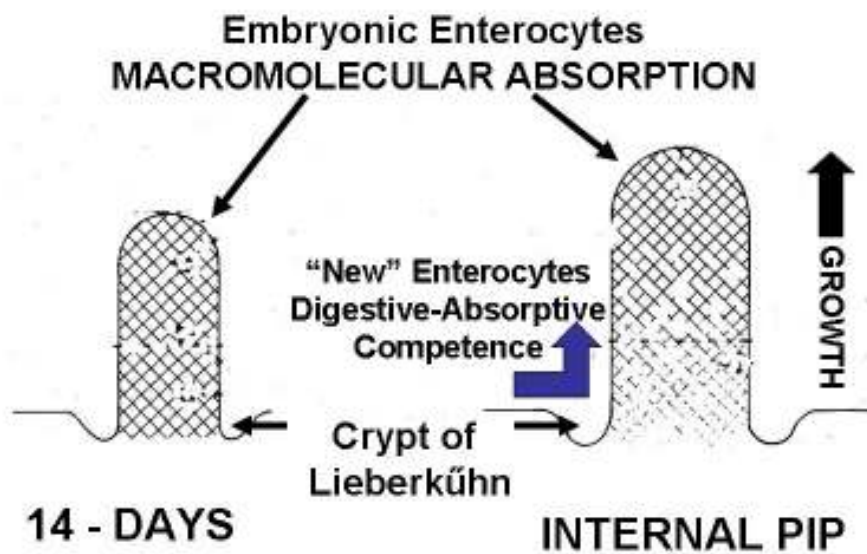


7 - DAYS → 14 - DAYS

14 - DAY CHICK EMBRYO



CHICK EMBRYO INTESTINAL VILLUS



CHICK EMBRYO BLOOD VOLUME

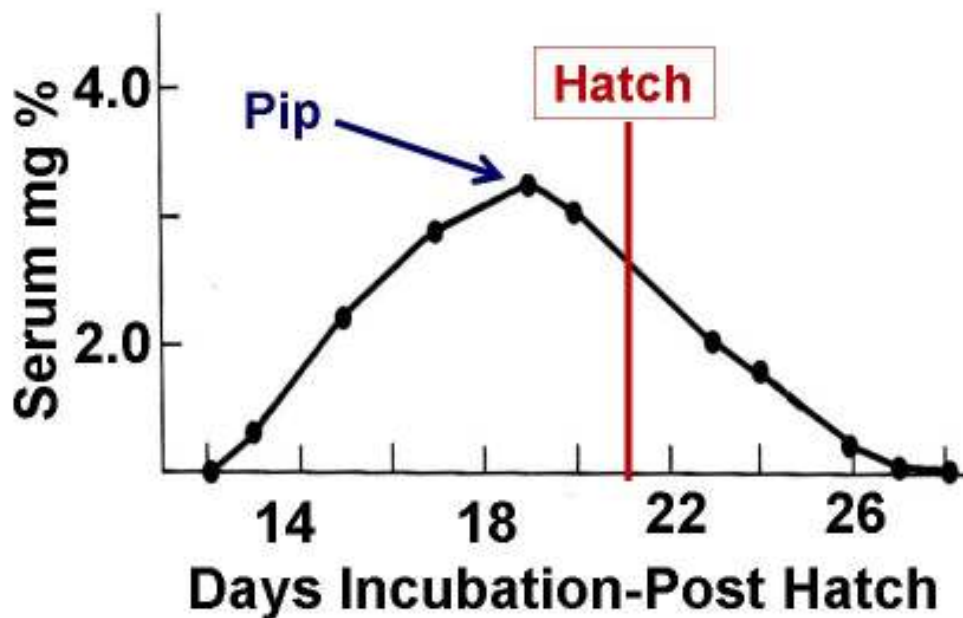
<u>Age, Days</u>	<u>Mean mm³</u>
8	368
9	513
10	679
12	1150
14	2150
16	3130
18	2580

Kind (1975)

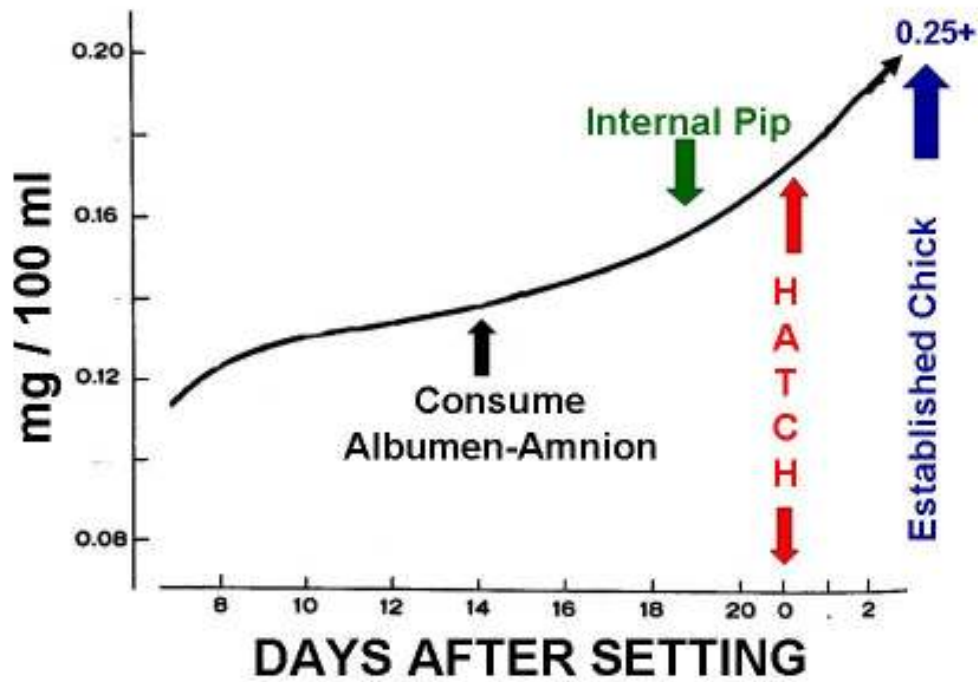
EGG ALBUMEN COMPOSITION

<u>Components</u>	<u>%Tot</u>	<u>%CHO</u>	<u>%CHO-NH₂</u>
Albumen	54	1.8	1.2
Transferin	13	0.9	1.7
Mucoid	11	8.5	13.6
Mucins	~2	9.8	7.1
Lysozyme	3	0	0

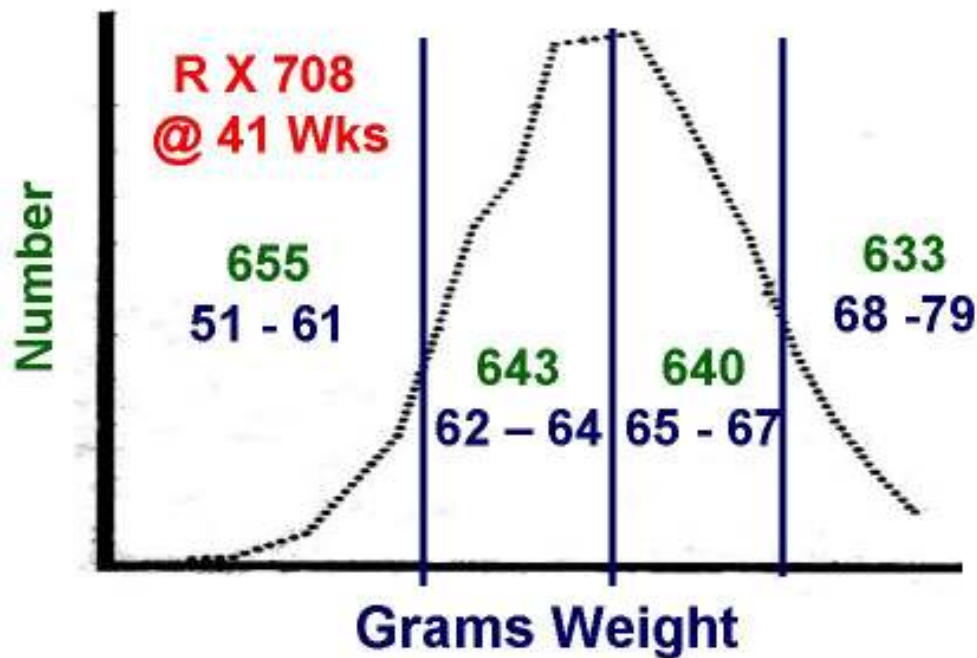
SERUM OVOMUCOID



CHICK EMBRYO BLOOD GLUCOSE



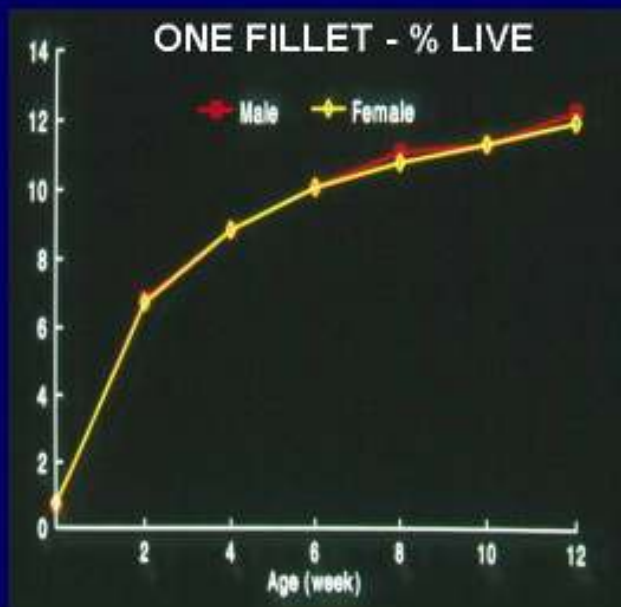
HATCHING EGGS WITHIN ONE COLLECTION



EGG WT: CHICK @ HATCH VS PLACEMENT

<u>Egg</u> <u>g Range</u>	<u>Hatch</u>	<u>g Chick Wt</u>	
		<u>24 Hr</u>	<u>Loss</u>
51 - 61	37.5	34.9	2.6
62 - 64	40.0	36.6	3.4
65 - 67	43.2	39.5	3.8
68 - 78	45.8	42.0	3.8

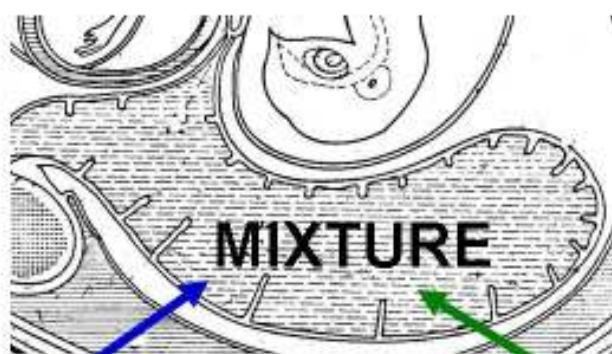
BROILER & BREAST GROWTH



PRESTARTING PROTEIN FOR BROILERS

0 – 7 D Prot/ME	g Weight		F/G		% Mort	
	BW	Gain	Period	Total	Period	Total
0 – 7 DAYS (Expt'l Feeds)						
<i>P</i> <	***	***	*	-	<i>ns</i>	-
23/3.15	175	134	1.40	-	0.4	-
24/2.85	185	144	1.48	-	0.6	-
7 – 21 DAYS (23 % Prot/3.15 Kcal/g)						
<i>P</i> <	***	**	<i>ns</i>	*	<i>ns</i>	<i>ns</i>
23/3.15	674	499	1.40	1.39	1.4	1.8
24/2.85	703	519	1.45	1.46	1.4	2.0

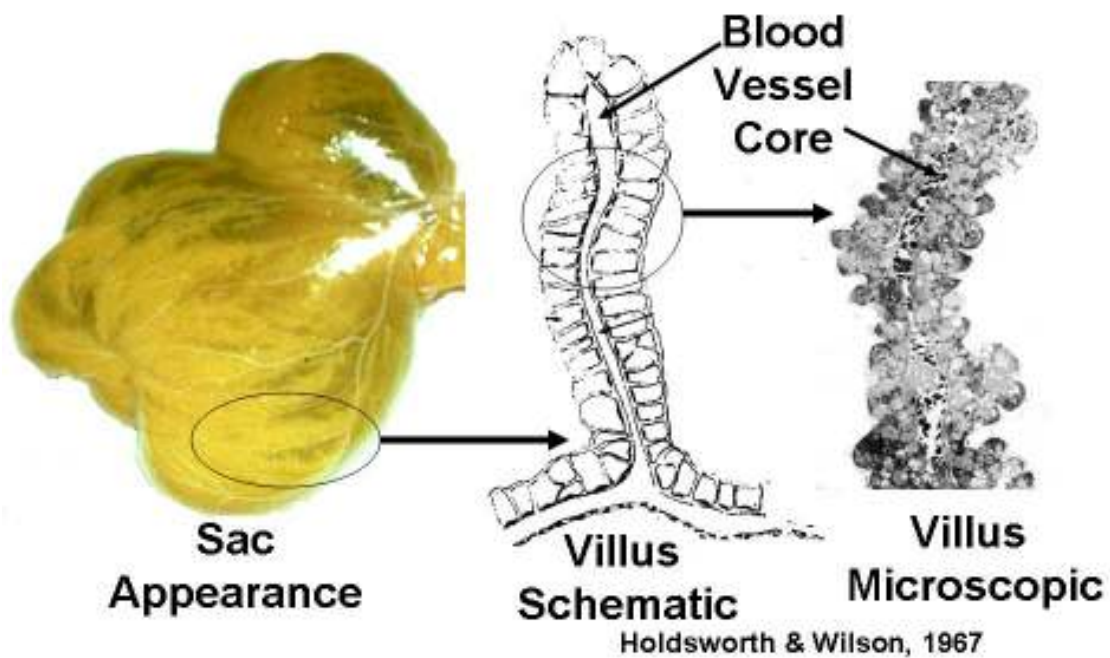
14 DAY EMBRYO YOLK SAC CONTENTS



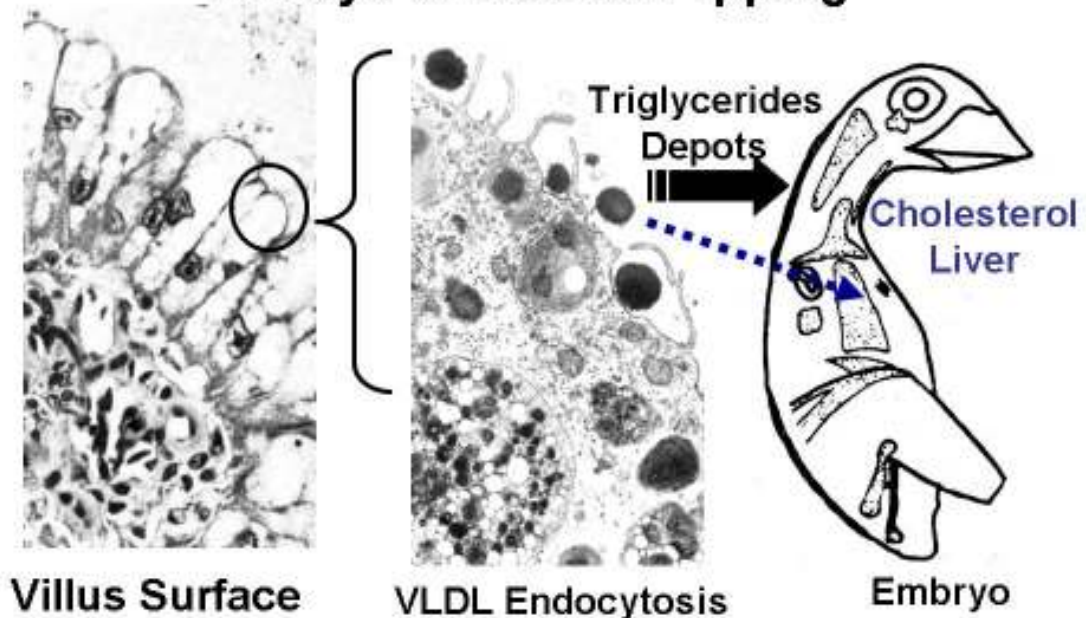
ORIGINAL YOLK
 VLDL's
 Phosvitin-
 Lipovitellin

INTESTINAL ENTRANTS
 Residual Albumen+
 Pancreatic Enzymes

YOLK SAC ABSORPTIVE VILLUS



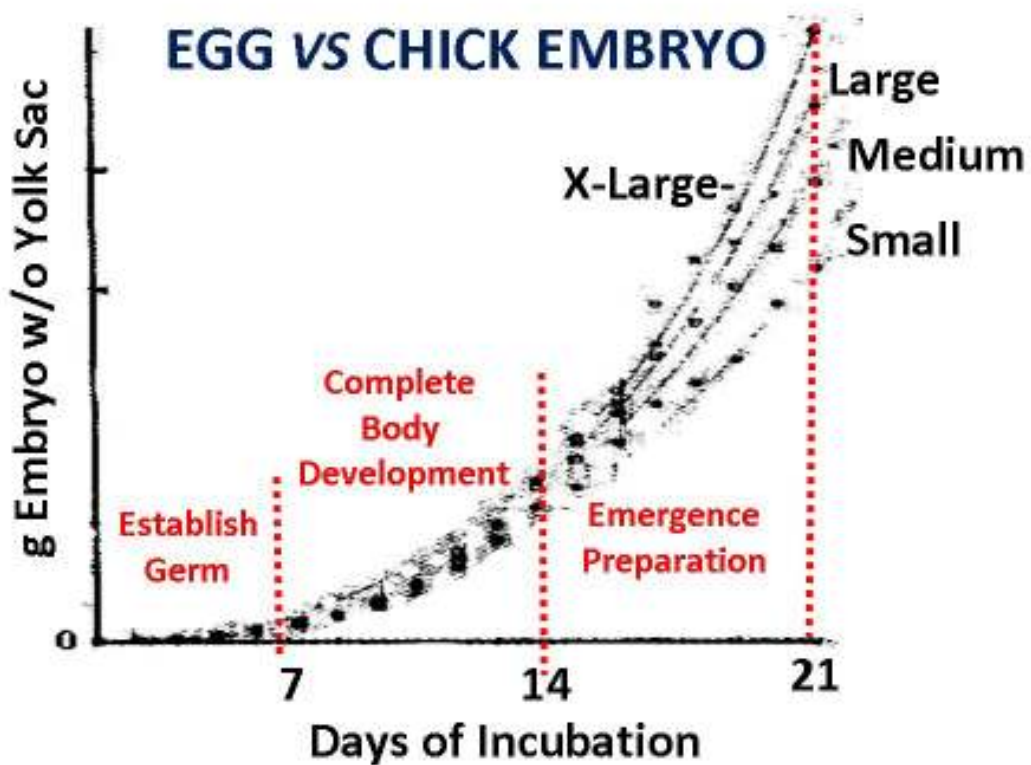
YOLK SAC VLDL RECOVERY & DEPOSITION 14 Days to Internal Pipping



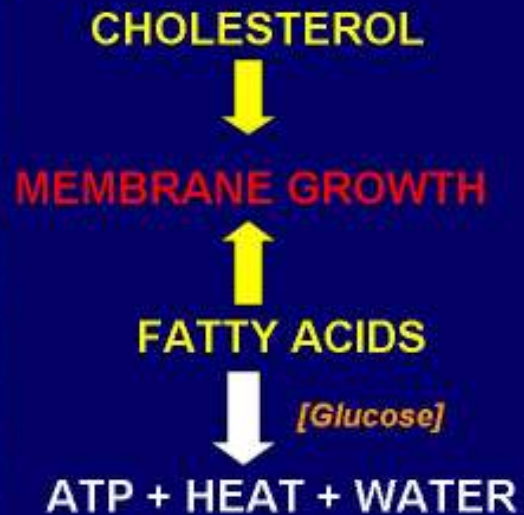
CHICK FAT DEPOTS



LOCATIONS AT HATCH



CHICK- DEPOT & LIVER LIPIDS



CHICK VARIABLES

<u>SOURCE</u>	<u>SEX</u>	<u>PLACEMENT</u>
R X 708	Male	At Hatch
26 Wk Brdrs	vs	vs
25 Chicks/Pen	Female	24 Hr Delay
64 Pens		

3Wk PERFORMANCE – CHICK VARIABLES

	<u>g Body Weight</u>			Feed	Mort
	<u>Start</u>	<u>3 Wks</u>	<u>S.D.</u>	<u>Conv</u>	<u>Tot %</u>
<u>Placmt</u>	***	***	*	<i>ns</i>	<i>ns</i>
0	34	689	67	1.42	2.2
24Hr	30	641	73	1.42	4.0
<u>Sex</u>	<i>ns</i>	***	**	*	<i>ns</i>
M	33	692	76	1.40	3.3
F	32	638	65	1.44	2.0
<i>SEM</i>	<i>0.4</i>	<i>3.8</i>	<i>2.7</i>	<i>0.012</i>	-

CHICK EMBRYONIC SKELETON

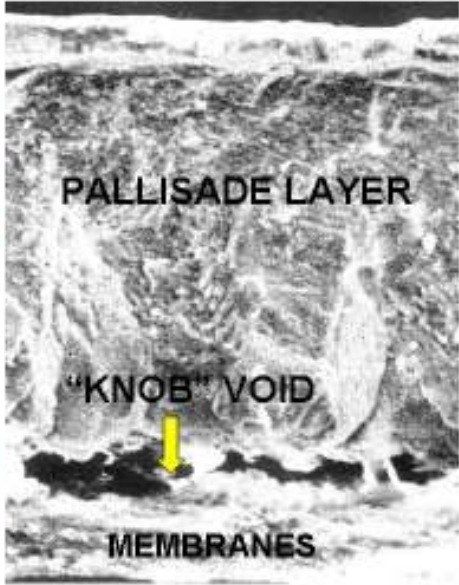
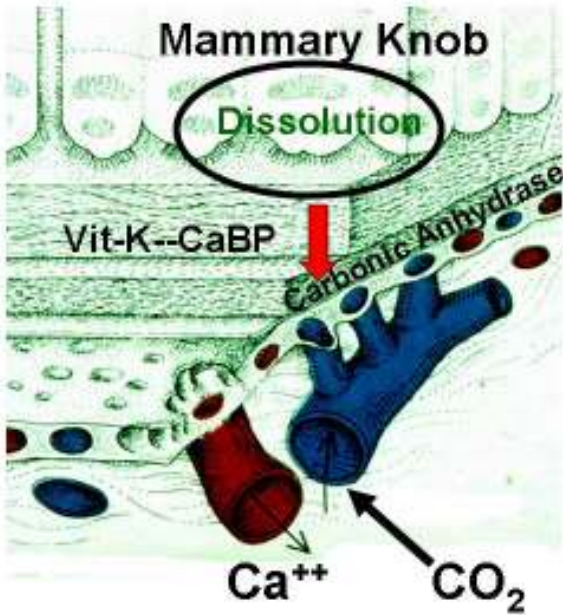


15- DAYS



INTERNAL PIP

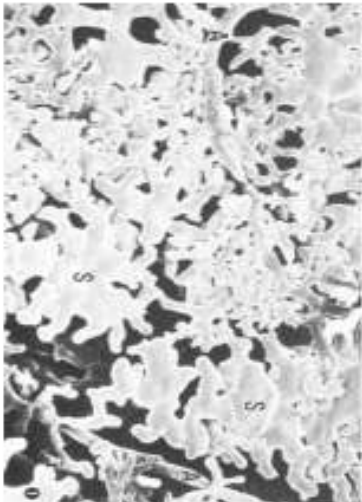
CHORIOALLANTOIS & SHELL CALCIUM



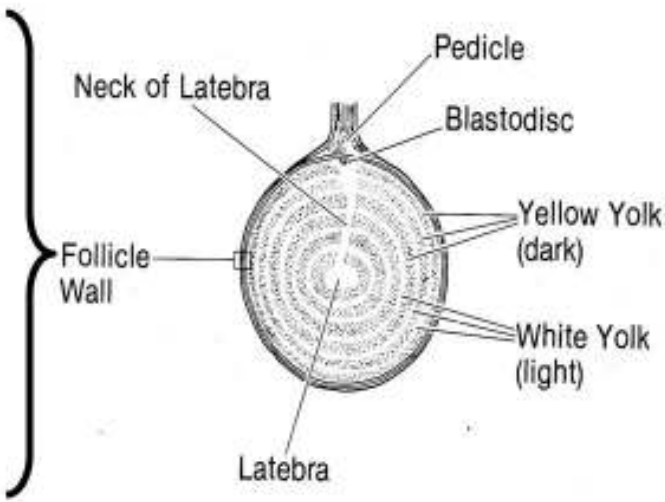
INCUBATION LOSS

Doskoch *et al.*, 1985

DEVELOPING HEN EGG OVUM

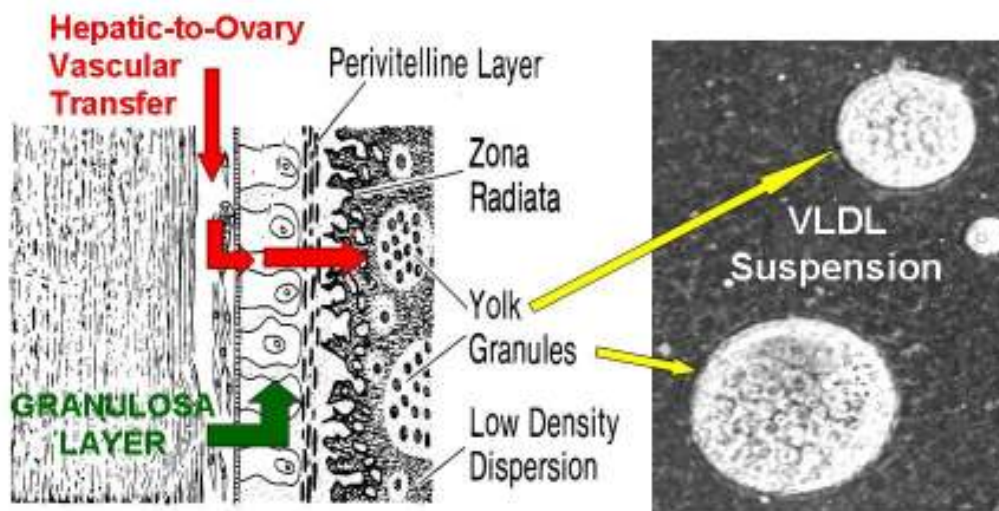


Surface Vascular Cast



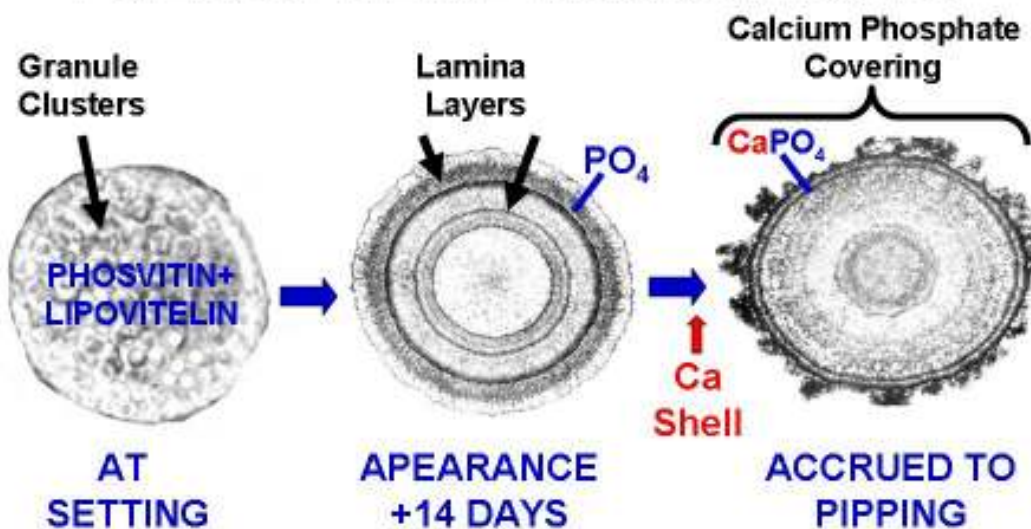
Cross Section

OVUM WALL & YOLK FORMATION



VITELLOGENIN → PHOSVITIN + LIPOVITELIN

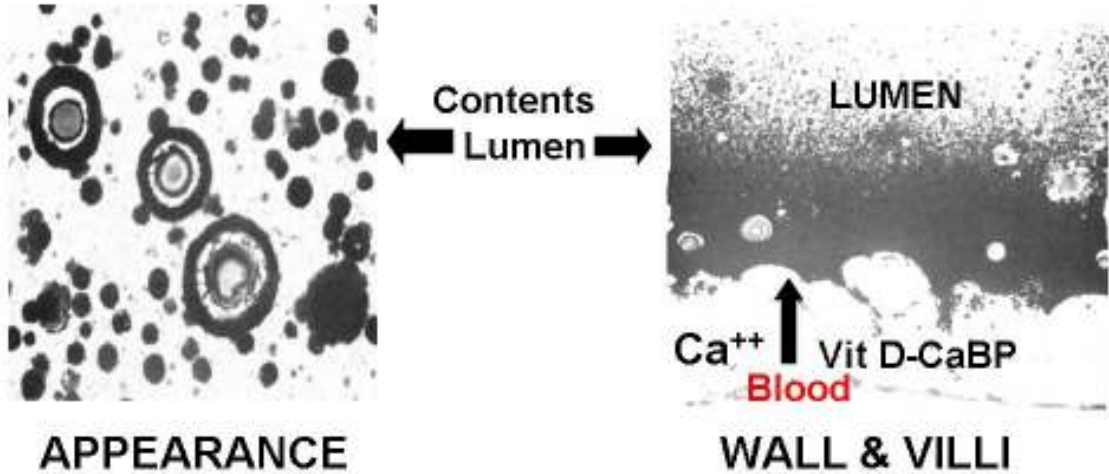
YOLK SPHERE TRANSITIONS



Cheville & Coignuol, 1984

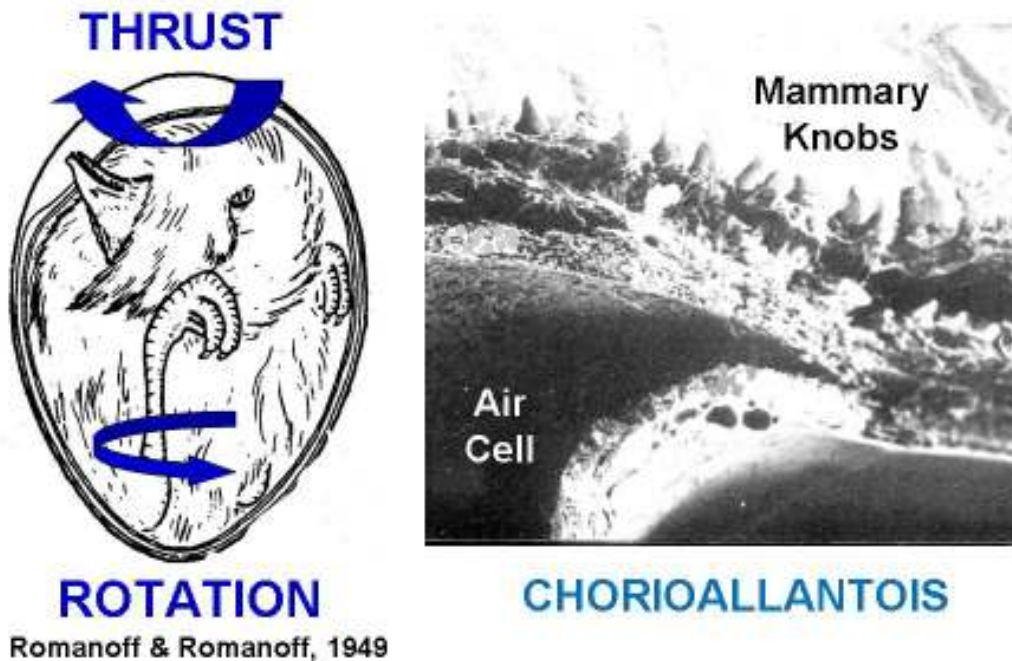
YOLK SAC CALCIFIED SPHERES ACCRUAL 14 DAY TO PIPPING

[Von Kossa H&E – Calcium]



Cheville & Coignuol, 1984

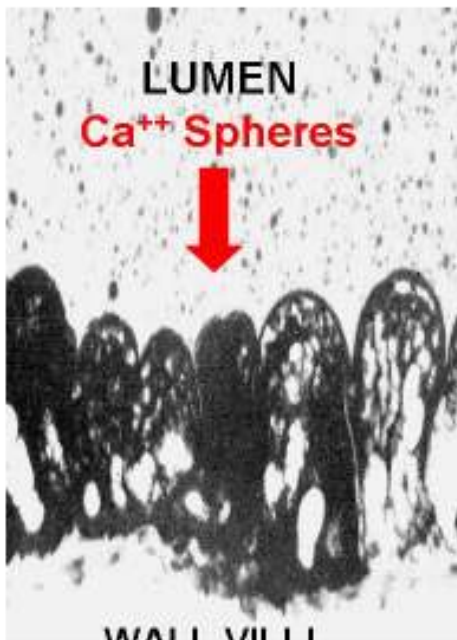
EMBRYONIC EMERGENCE



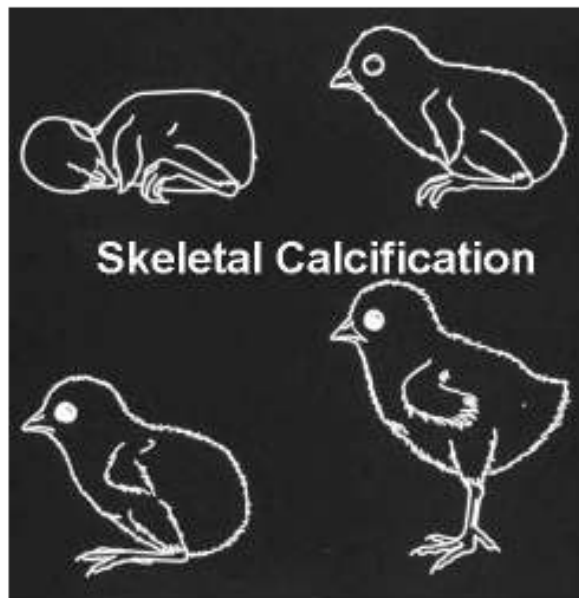
CHICK EMERGING FROM SHELL



POST-PIP **YOLK SAC SPHERES**



Cheville & Coignoul, 1984



EMERGENCE & POSTURE

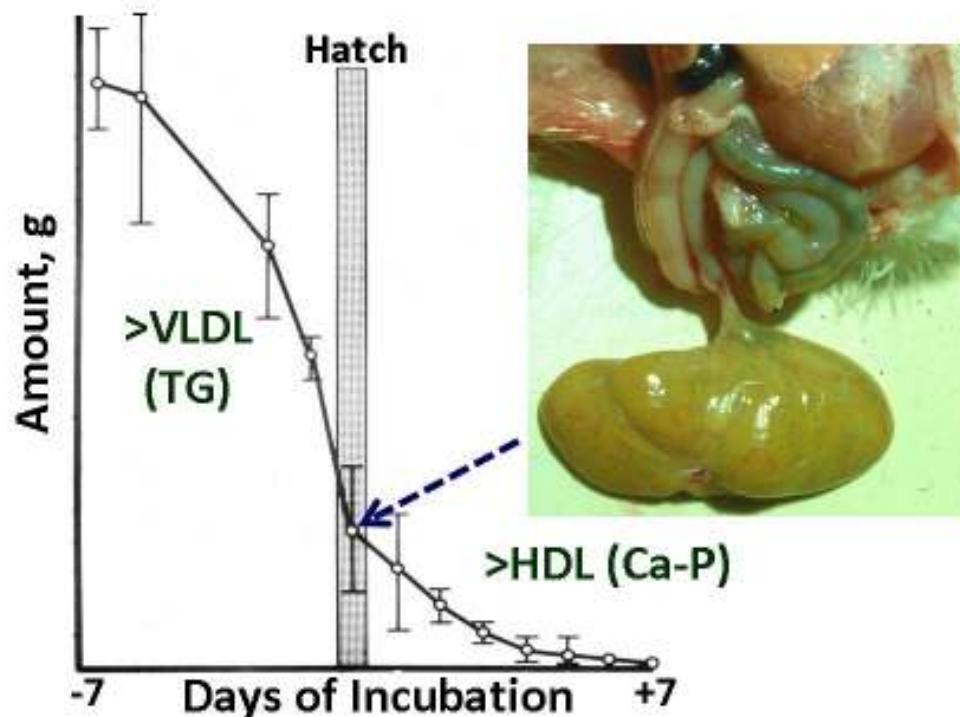
BREEDER FEED % Total P	0.2	0.6	1.0
<u>Chick</u>	<u>At Hatch</u>		
BW (g)	43.4	43.2	43.5
Yolk P (mg / g)	9.4	9.5	9.8
Plasma P (mg / l)	34.4	36.2	38.8
<u>Tibia</u>			
Elasticity (N / μ^2)	3.9	4.2	4.6
Stiffness (N / cm)	205	207	211
Ash (%)	34.0	35.1	38.5

(Triuwanta *et al.*, 1992)

POULT
"FLIP"
3 Days

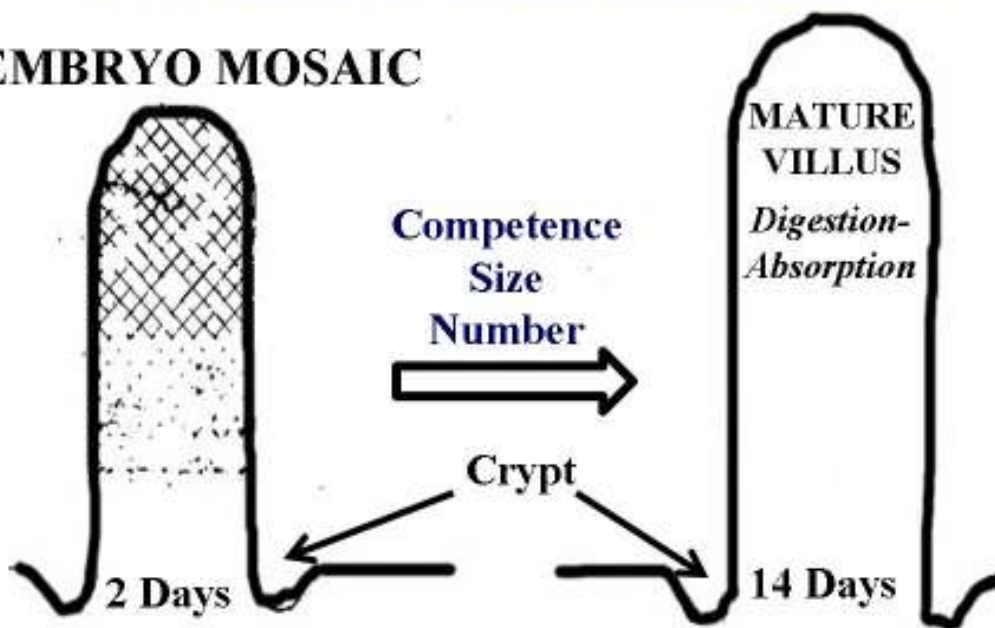


PRE- & POST HATCH CHICK YOLK SAC

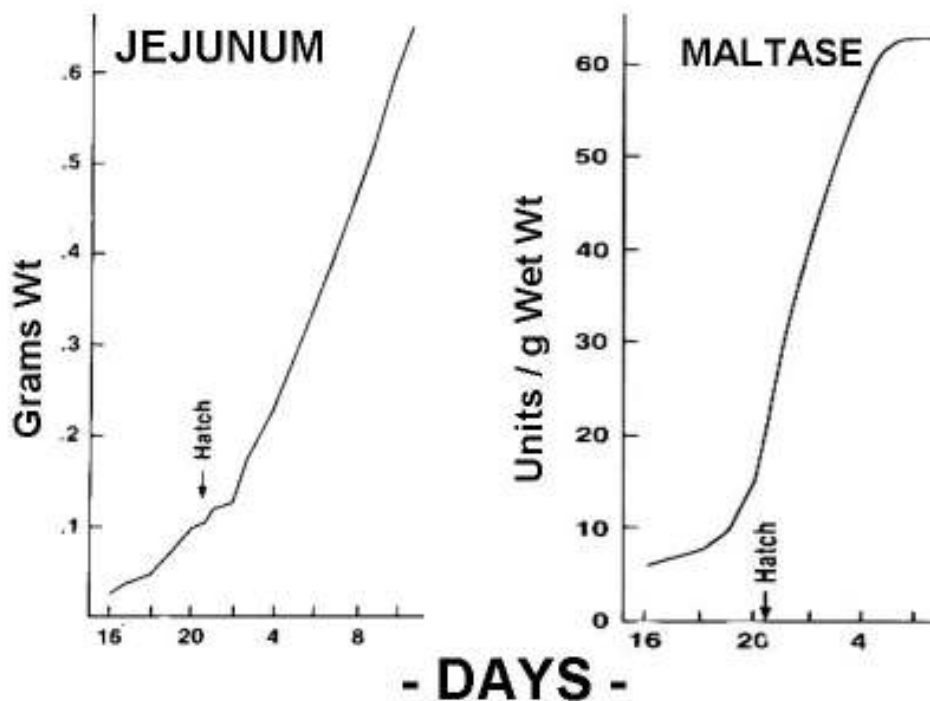


TRANSITIONAL MUCOSA

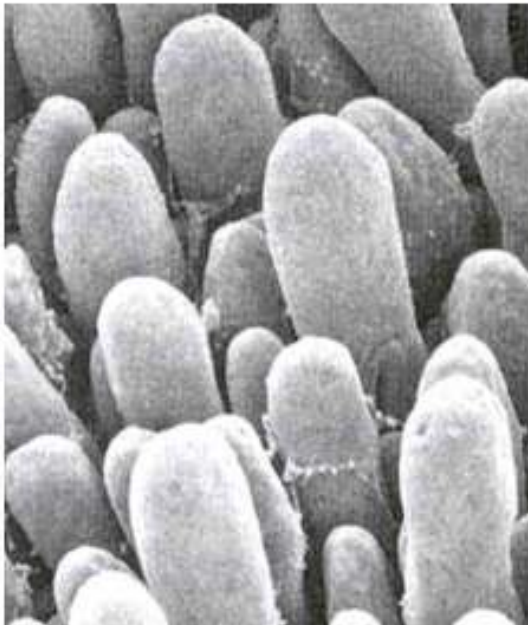
EMBRYO MOSAIC



EMBRYONIC DIGESTIVE TRANSITION



EARLY CHICK SMALL INTESTINE



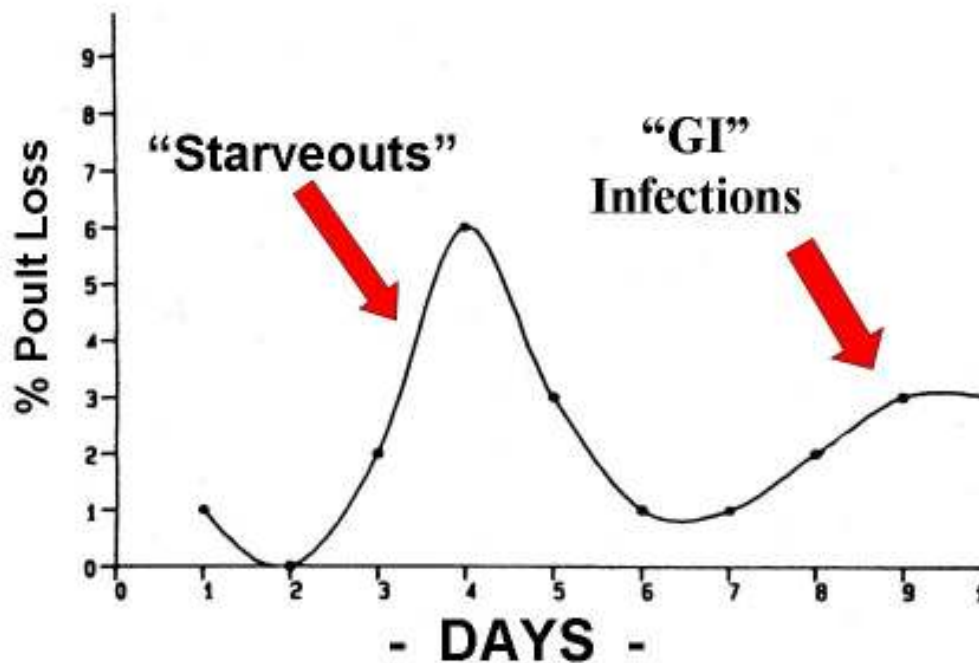
VARYING SIZE
DISTRIBUTION



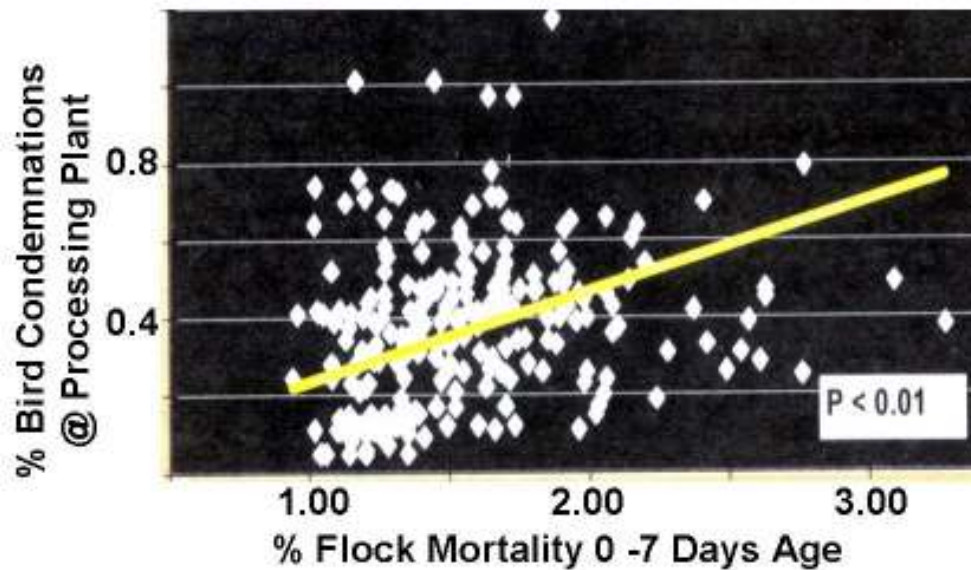
DISCONTINUITIES

Beyer et al., 1975

POULT POST-HATCH DEATH



EARLY CHICK DEATH & MARKET LOSS



Australian Poul. Sci. Inst., Feather Fax 2011

CECAL EXCRETA-COPROPHAGY-INTESTINAL COLONIZATION



Hen
"Environment"
↓
Ceca
Microflora



Microbe
Enzymes
↓
Phytase
NDF'ases
CHO'ases

FEED & ENZYMES: 3 WK BROILERS

<u>FEED</u>	<u>ENZ</u>	<u>BW, g</u>	<u>S.D.</u>	<u>F/G</u>	<u>% Mort</u>
Corn-Soy	0	674	78	1.58	3.0
Control	+	678	60	1.33	2.9
- 100Kcal& 0.1% P	0	634	74	1.47	3.7
	+	673	69	1.31	2.8
SEM		5.4	1.4	0.031	-
Feed		**	NS	NS	NS
Enzymes		**	*	***	NS
F X E		***	NS	NS	NS

Moran Unpub.

PRESTARTER 0 – 3 DAYS “As Is”



- 1- ME 3000 Kcal / Kg & ~ 25% Crude Prot.
- 2- EAA= 1.40 Lys., 1.00 TSAA, Thr. 0.95%
- 3- Avail. P = 0.55 & Total Ca 1.25 %
- 4- Phytase, Xylanase, Amylase, Protease