

Study on the productivities and meat quality of AC chicken (black – bone chicken) in Vietnam

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Abstract: AC chicken is one of the special indigenous chicken breed in Vietnam. They are short, mild with small and long head but a short neck. It can be easily distinguished from the other chicken breeds with the following characteristics: Silkies feather; tasseled head; duplicated crown; green ears; beard; hairy leg; five toes; black skin; black bone and black meat.

For a long time ago, people in Vietnam has used Ac chicken meat as a tonic food for old people, for the women after they have baby. Ac chicken is one of the smallest chicken with the body weight at 8 weeks are about 250-300 g for the female and from 300- 350g for the male and at 16 weeks of age are 400-600 g for the female and 650-750g for the male. The mortality rate is 2-5% from one day old to 8 weeks of age. The feed conversion is about 1.5- 3.0 kg/kg of weight gain. The egg production is from 91-96 eggs/bird/year with the highest of laying rate of 38-39% in the second laying month. The fertility rate is from 90-95% but the hatchability is very low of 60-75%/total hatching eggs. Ac chicken egg is very small of 23.38 – 31.17g.

The Ac chicken meat is nourishing. The protein content of Ac chicken meat is higher than the other chicken meat (Ri chicken):from 21.94-24.80 % in comparison with 21,3 – 23.0% in Ri chicken meat. Ac chicken meat contains many kinds of amino acid (17 amino acid, including 8 essential aminoacid for human body), vitamin (A,B1..), mineral (Ca, P, Fe, Na, K, Mg, Zn, Cu..) and a lot of fatty acid (including essential fatty acid as lonoleic, linoleneic and arachidonic..). The pH value is 5.9-6.3 and the water losing after cooking is about 19.21 – 20.22% in comparision with 21.33-22.96% in Ri chicken and 26.34-27.22% in broiler chicken meat. The water holding capacity of Ac chicken meat is also very high.

The price of 1 kg of Ac chicken meat is about 4-5 \$, during the price of 1 kg of Ri chicken meat is 1.5 \$ and broiler meat is 1\$. Raising Ac chicken brings people a good income.

Study on the productivities and meat quality of AC chicken (black – bone chicken) in Vietnam

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1. Introduction: AC chicken is one of the special indigenous chicken breeds in Vietnam. They are short, mild with small and long head but a short neck. It can be easily distinguished from the other chicken breeds with the following characteristics: Silkies feather; tasseled head; duplicated crown; green ears; beard; hairy leg; five toes; black skin; black bone and black meat. Ac chicken is one of the smallest chicken with the body weight at 8 weeks are about 250-350 g.

For a long time ago, people in Vietnam has used Ac chicken meat as a tonic food for old people, for the women after they have baby. Why did they do that, until now we have no answer. As no scientific Data were available on the production potential of these chicken breed, trial were conducted in order to provide a phenotypic characterization of the Ac chicken and test for the growth rate , feed conversion, egg production carcass traits and meat quality.

2. Material and methods

The experiment was conducted at Animal Husbandry Research Institute from 1998-2002.

2.1. Material: Ac chicken were selected from the small farms of the farmers in Longan Provinces (in the South Vietnam) with the typical characteristics of breed.

2.2. Methods

Ac chicken were kept in intensive method in opened houses with concentrated feed. The density of 20 birds/m² (1-28 days old); 15 bird/m² (from 29 – 49 days old), then 8 bird/m² after 7 weeks of age.

The temperature at one day old is about 30°C, then reduced 2°C each week. The light time 24 hour at 1day old to 28 days old.

2.3. The criteria:

Egg production:

- The first laying age (days)
- Egg production (eggs/hen/year)
- Laying rate (%)
- Egg weight (g)
- Egg quality (form index; yolk index; albumin index; Haugh unit...)
- Fertility rate (%)
- Hatchability rate (%)
- Feed conversion/10 eggs (kg)

The growth rate and meat productivity

- Liveweight through weeks of age (g)
- Feed conversion (kg feed/kg weight gain)
- Carcass rate (%)

- Thigh meat rate (%)
- Breast meat rate (%)
- Abdominal fat content

Meat quality

- Meat composition (protein; fat; water; ash)
- Vitamin content
- Mineral content (trace element)
- Amino acid content
- Fatty acid content
- Collagen content
- Water holding capacity (%)
- PH value

3. Result and discussion

3.1. Egg production:

The first laying egg of Ac chicken is from 115-122 days, with the laying rate in the table 1:

Table 1: Egg Production and laying rate of Ac chicken

Laying month	Population herd (n=131 hens)				Family herd (n=50 hens)		
	Laying rate (%)		Egg/bird/month		Laying rate (%)	Egg/bird/month	
	X ± SD	CV%	X ± SD	CV%		X ± SD	CV%
1	24,54 ± 4,25	17,33	4,34 ± 3,74	86,11	26,83	7,78 ± 1,88	24,12
2	39,09 ± 1,34	3,42	11,92 ± 0,62	5,22	39,81	12,34 ± 2,44	19,76
3	32,50 ± 1,30	4,01	9,84 ± 0,67	6,80	32,93	9,88 ± 2,71	27,41
4	25,19 ± 0,87	3,44	7,75 ± 0,27	3,47	25,74	7,98 ± 2,67	33,44
5	23,68 ± 0,64	2,72	7,22 ± 0,31	4,27	24,33	7,30 ± 3,09	42,36
6	23,70 ± 0,55	2,33	7,29 ± 0,22	2,96	26,45	8,20 ± 3,83	46,68
7	22,18 ± 0,64	2,87	6,82 ± 0,23	3,36	27,61	8,56 ± 3,42	39,93
8	25,00 ± 0,27	1,07	7,63 ± 0,33	4,31	25,27	7,58 ± 2,63	34,66
9	23,66 ± 0,51	2,16	7,27 ± 0,15	2,07	23,74	7,36 ± 2,87	38,99
10	22,08 ± 0,59	2,67	6,73 ± 0,06	0,85	21,93	6,58 ± 1,76	26,78
11	24,56 ± 0,54	2,18	7,55 ± 0,21	2,73	24,77	7,68 ± 1,75	22,85
12	18,91 ± 0,79	4,19	5,77 ± 0,26	4,54	18,93	5,68 ± 1,61	28,33
Sum eggs/year			91,30			95,30	

The egg production of Ac chicken is very low in comparison with other local chicken breeds : from 91.30 – 95.53 eggs/hen/year for Ac chicken and 1240 eggs/hen/year for Ri chicken and 75.60 eggs for Mia chicken and 67.71 eggs/hen/year for Dongtao chicken.

Table 2: Egg weight of Ac chicken

Laying age	N	Egg weight (g)	
		X ± SD	CV%
5% of laying rate	130	23,39 ± 21,42 ^A	91,58
38. weeks of laying age	220	30,53 ± 2,71 ^B	8,88
In general	2063	31,17 ± 7,79 ^C	24,99

Egg weight of Ac chicken are significant different between periods ($P < 0,001$) and they are the smallest eggs in comparision with other local chicken (23.39g for Ac chicken, 45.33g for Ri chicken and 47.18 for Mia chicken and 45.33 for Dongtao chicken.

Table 3: Egg parameter at 38 weeks of age (n=30)

Criteria	Unit	X ± SD	CV%
1. Egg weight	G	30,640 ± 3,440	11,229
2. Form index	%	76,730 ± 2,56	3,343
3. Yolk high	mm	15,705 ± 0,82	5,223
4. Albumin high	mm	5,199 ± 0,790	15,205
5. egg shell thick	mm	0,314 ± 3,047	9,711
6. Yolk index	%	45,67 ± 2,451	19,730
7. Albumin index	%	81,989 ± 160176	5,368
8. Strengthen	kg/cm ²	3,930 ± 0,753	19,171
9. Haugh unit		82,854 ± 4,713	5,687
10. Yolk rate	%	36,802 ± 3,073	8,350
11. Albumin rate	%	49,944 ± 3,718	7,445
12. Shell rate	%	12,255 ± 1,161	8,755
13. Yolk/albumin	%	74,563 ± 12,408	16,640

Ac chicken egg is little long and the yolk index is high.

Table 4: Fertility and hatching rate of Ac chicken through years

Criteria	Year 1997		Year 1998		Year 1999		Year 2000	
	X ± SD	CV%	X ± SD	CV%	X ± SD	CV%	X ± SD	CV%
Egg number	87,38 ± 32,96	37,71	172,08 ± 82,74	48,08	131,06 ± 68,54	52,30	239,85 ± 29,90	12,46
Fertility rate (%)	94,66 ± 2,18	45,30	92,79 ± 6,24	6,72	95,76 ± 2,14	2,24	90,76 ± 1,80	1,99
Hatching rate/egg number (%)	60,35 ± 8,34 ^A	2,30	51,56 ± 12,34 ^B	23,93	62,80 ± 8,47 ^C	13,48	72,37 ± 3,70 ^D	5,11
Hatching rate/fertility egg (%)	63,69 ± 8,16 ^A	13,82	55,79 ± 13,94 ^B	24,98	65,60 ± 8,91 ^C	13,59	79,74 ± 3,85 ^D	4,83

The letter A,B,C,D in the colum show the significant different between years.

The hatching rate of ac chicken eggs is rather low: The reason are: Ac chicken egg is very small but they are incubated with all the other chicken eggs in the same incubator, then the temperature and humidity are not suitable for Ac chicken eggs.

Table 5: Feed conversion/10 eggs of Ac chicken

Laying month	Feed conversion (kg/kg weight gain)	
	X \pm SD	CV%
1	2.12 \pm 3,24	15,32
2	1.59 \pm 4.64	2,92
3	1.81 \pm 7.23	4,03
4	2.30 \pm 2.41	1,05
5	2.38 \pm 9.59	4,03
6	2.49 \pm 1.65	6,62
7	2.59 \pm 2.52	9,74
8	2.36 \pm 1.22	5,16
9	2.55 \pm 1.53	5,99
10	2.66 \pm 1.28	4,80
11	2.32 \pm 1.68	7,22
12	2.98 \pm 3.06	10,27

The feed conversion/10 eggs of Ac chicken is lower than in comparison with Ri chicken (2.35 kg and 2.67 kg).

3.2. The growth rate and meat productivity

Table 6: Number of dead birds and mortality rate of Ac chicken

Week of age	Number	%
0-1	7	3
0-2	9	3.9
0-3	10	4.4
0-4	16	6.9
0-5	20	8.7
0-6	22	9.6
0-7	24	10.4
0-8	-	-
0-9	-	-

The result show that, The mortality of Ac chicken is high, because Ac chicken is developed well in the warm condition with the temperature of about 22-30oC, and the mortality of Ac chicken is concentrated in the 7th. first weeks.

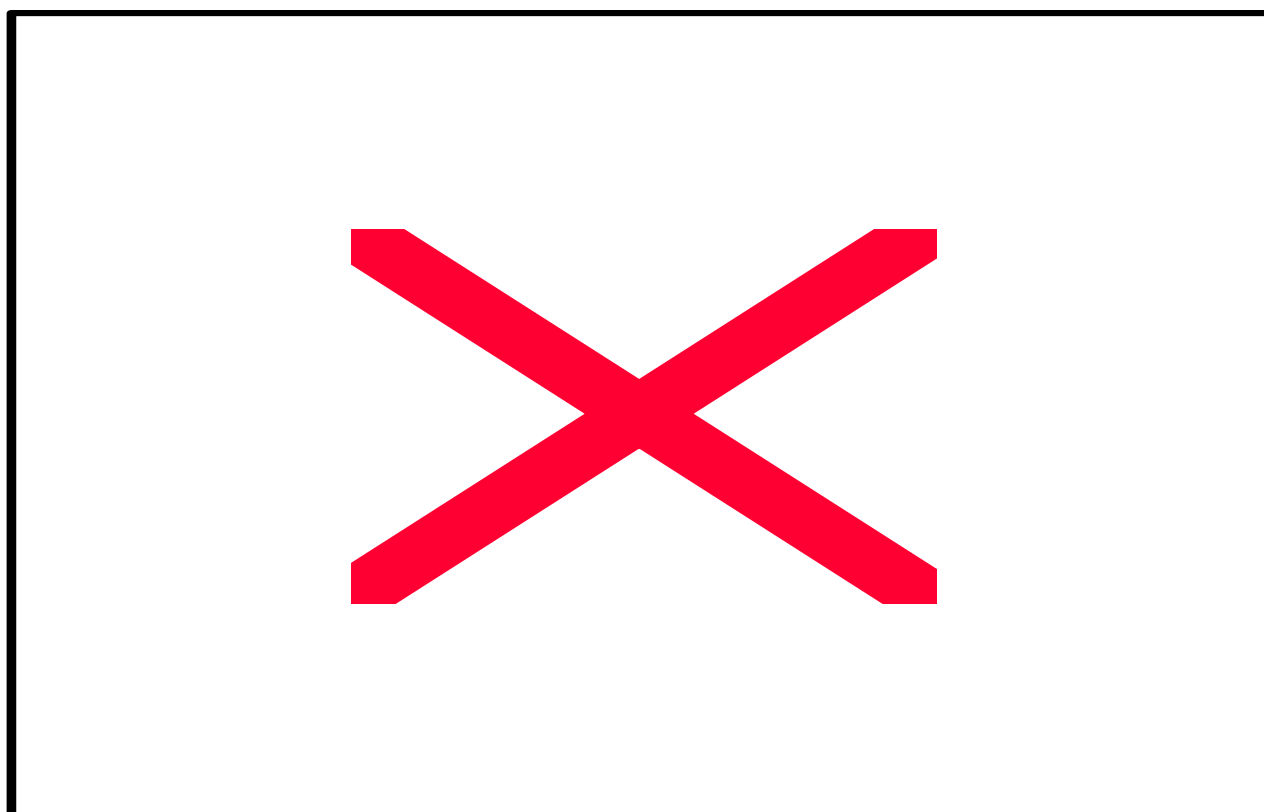
The body weight of Ac chicken is in table 7: they are very small in comparison with other local chicken breeds (the body weight at 8. Weeks of age of Ac chicken is only from 361.9 g – 407.4 g And Ri chicken is about 559g, and 656 g of Mia chicken ;778 g for Dongtao chicken).

Significant differences were found among the male and female.

Table 7 : Body weight of Ac chicken through weeks of age

Week of age	Male		Female	
	N	X \pm SD	N	X \pm SD
One day old	99	19.9 \pm 2.2 ^A	131	18.9 \pm 2.1 ^B
1	99	35.8 \pm 3.5 ^A	124	33.5 \pm 3.9 ^B
2	99	61.3 \pm 6.4 ^A	122	57.2 \pm 5.7 ^B
3	99	91.9 \pm 11.3 ^A	121	85.3 \pm 9.1 ^B
4	97	131.7 \pm 14.7 ^A	117	119.6 \pm 12.9 ^B
5	95	190.2 \pm 20.1 ^A	115	171.0 \pm 17.9 ^B
6	95	249.6 \pm 27.5 ^A	113	222.8 \pm 20.9 ^B
7	95	320.2 \pm 33.9 ^A	111	284.8 \pm 20.9 ^B
8	90	407.4 \pm 31.9 ^A	106	361.9 \pm 24.7 ^B
9	85	513.0 \pm 31.6 ^A	101	446.7 \pm 23.8 ^B

The letters A,B in each column show the significant different between male and female chicken (P<0.001)



The feed conversion (table 8) varried from 2.8 –3.1 kg/kg weight gain for of Ac chicken and not very high in comparision with Ri chicken (3.55 kg) and Mia chicken (3.59 kg)... The feed conversion of Ac chicken is higher than Kabir chicken (exotic chicken with 2.91kg). The behaviour of feeding of local chicken may have an influence on their performance.

Table 8: Water and food consumption and feed conversion of Ac chicken

Week of age	Water consumption (ml/bird/day)	Food consumption (g/bird/day)	Feed conversion (kg food/ kg weight gain)
1	6.3	3.3	1.5
2	14.2	6.3	1.8
3	19.5	9.5	2.3
4	29.7	13.9	2.7
5	37.1	17.3	2.2
6	49.2	23.1	3.0
7	62.2	28.7	3.1
8	66.3	32.8	2.8
9	76.8	38.0	2.8

Table 9: Meat production of Ac chicken (slaughter at 7. 8 and 9 weeks of age)

Age	7. Week		8. Week		9. Week	
Criteria	Ac chicken (n=10)	Ri chicken (n=10)	Ac chicken (n=10)	Ri chicken (n=10)	Ac chicken (n=10)	Ri chicken (n=10)
	X ± SD	X ± SD	X ± SD	X ± SD	X ± SD	X ± SD
Live weight (g)	311,0 ±28,4	562,0±75,5	396,0±26,3	650,0±93,6	495,0±36,8	745,0±114,0
Carcass rate % ¹	72,9 ± 3,0	71,0 ±1,5	69,5 ±1,5	75,0±1,6	71,9±2,5	73,0±3,1
Adominal fett rate (%) ²	1,25±0,68	0,16±0,22	0,53±0,84	1,04±0,46	0,78±0,59	0,98±0,42
Thigh meat rate (%) ²	19,04±0,94	18,27±2,90	20,11±0,60	20,16±0,91	19,28±1,75	20,67±1,40
Breast meat rate (%) ²	16,10±1,17	13,69±1,74	16,96±0,64	15,98±0,98	16,68±1,28	16,85±0,88
Liver rate (%) ²	4,03±0,19	3,48±0,60	3,61±0,51	3,44±0,23	3,22±0,27	3,30±0,51
Heart rate (%) ²	0,77±0,07	1,11±0,18	0,87±0,08	1,04±0,18	0,85±0,08	1,05±0,18
Gizzard rate (%) ²	5,72±1,27	4,30±1,01	4,98±0,8	4,69±0,84	4,91±0,51	4,26±0,62

1: % of carcass without head, leg but included heart, liver and gizzard/ live weight

2: % these parts/carcass weight

The different between Ac and Ri is not significant ($P>0,05$).

3.2. Meat quality

Table 10: Meat composition (Protein, fat water and ash content) of Ac and Ri chicken at 8. Week of age

Criteria	Ac chicken (n=34)		Ri chicken (n=6)	
	X \pm SD	CV%	X \pm SD	CV%
Thigh meat				
Water (%)	74,676 \pm 0,680 ^A	0,911	75,50 \pm 0,51 ^B	0,68
Protein (%)	21,920 \pm 0,473 ^A	2,156	21,08 \pm 0,45 ^B	2,13
Fat (%)	1,969 \pm 0,779 ^A	39,534	1,16 \pm 0,11 ^B	9,41
Ash (%)	1,127 \pm 0,082	7,318	1,17 \pm 0,05	4,26
Breast meat				
Water (%)	73,621 \pm 0,504 ^A	0,684	74,74 \pm 0,54 ^B	0,72
Protein (%)	24,643 \pm 0,534 ^A	2,169	23,61 \pm 0,43 ^B	1,82
Fat (%)	0,630 \pm 0,172 ^A	27,245	0,35 \pm 0,04 ^B	10,55
Ash (%)	1,137 \pm 0,085 ^A	7,438	1,29 \pm 0,02 ^B	1,79

The letter A,B in each colum show the significant different between Ac and Ri chicken $P<0,05$

The protein content of ac chicken meat is higher than that of Ri chicken especiaaly in breast meat (24.64% for Ac chicken breast meat in comparision with 23.61% for Ri chicken breast meat). All the other components of Ac chicken meat are also higher than that for Ri chicken meat.

The vitamins content is in table 11. The vitamin B1 of Ac chicken is not very high, but the vitamin A content is rather high 50-56 μ g in comparision with the broiler chicken (only 9.9 μ g) – Souci – Fachmann – Kauft – 1969)

Table 11: Vitamin A and B1 content of Ac chicken meat

Criteria	Male (n=6)		Female (n=6)	
	X \pm SD	CV%	X \pm SD	CV%
Vitamin B1 (mg%)	0,037 \pm 0,02	40,540	0,036 \pm 0,01	26,59
Vitamin A(microgram)	50,67 \pm 2,16	4,26	56,00 \pm 3,23	5,76

Table 12: Mineral content (trace element) (mg/100g) of Ac chicken meat at 8. Week of age

Criteria	Male (n=6)		Female (n=6)		Male + female (n=12)	
	X \pm SD	CV%	X \pm SD	CV%	X \pm SD	CV%
K	457,436 \pm 95,115	20,702	423,692 \pm 18,907	4,462	441,565 \pm 67,994	15,398
Na	220,883 \pm 25,255	11,434	211,050 \pm 15,999	7,580	215,967 \pm 20,800	9,631
Mg	82,842 \pm 9,515	11,485	84,158 \pm 8,503	10,104	83,500 \pm 8,630	10,336

Mn	0,500 ± 0,144	28,829	0,351 ± 0,096	27,304	0,426 ± 0,140	33,014
Ca	0,735 ± 0,138	18,804	0,687 ± 0,151	21,934	0,712 ± 0,140	19,703
Zn	6,025 ± 0,553	9,182	6,714 ± 0,965	14,369	6,370 ± 0,831	13,057
Fe	14,745 ± 5,277	35,785	18,216 ± 6,393	35,092	16,481 ± 5,875	35,649
Cu	0,531 ± 0,076	14,224	0,690 ± 0,273	39,525	160,611 ± 0,208	34,086

The mineral content of Ac chicken meat is higher in comparison with broiler and other pultry meat especiaaly Iron content of Ac chicken is higher than other chicken meat (16.48 in comparison with 1.8 mg of broiler chicken and 2.1 g of duck meat).

Table 13: Amino acid content of Ac and Ri chicken meat at 8. Week of age

Criteria	Ac chicken (n=23)		Ri chicken (n=6)	
	X ± SD	CV%	X ± SD	CV%
Acid aspartic (g)	2,153 ± 0,121 ^A	5,644	1,948 ± 0,163 ^B	8,370
Acid Glutamic (g)	3,323 ± 0,206 ^A	6,204	2,998 ± 0,209 ^B	6,962
Serine (g)	0,978 ± 0,061 ^A	6,219	0,864 ± 0,065 ^B	7,539
Histidine (g)	0,939 ± 0,048 ^A	5,073	0,694 ± 0,081 ^B	11,721
Glycine (g)	0,984 ± 0,053 ^A	5,380	0,875 ± 0,070 ^B	7,970
Threonine (g)	1,086 ± 0,061 ^A	5,635	0,968 ± 0,073 ^B	7,511
Alanine (g)	1,627 ± 0,074 ^A	4,558	1,336 ± 0,098 ^B	7,326
Arginine (g)	1,508 ± 0,083 ^A	5,478	1,371 ± 0,108 ^B	7,903
Tyrosine (g)	0,861 ± 0,042 ^A	4,914	0,796 ± 0,070 ^B	8,803
Valine (g)	1,221 ± 0,096	7,874	1,203 ± 0,268	22,255
Methionine (g)	0,489 ± 0,094	19,320	0,406 ± 0,109	26,946
Phenylalanine (g)	1,030 ± 0,065 ^A	6,326	0,921 ± 0,082 ^B	8,943
Isoleucine (g)	1,047 ± 0,065 ^A	6,239	0,920 ± 0,090 ^B	9,736
Leucine (g)	1,965 ± 0,108 ^A	5,509	1,738 ± 0,147 ^B	8,481
Lysine (g)	1,981 ± 0,103 ^A	5,204	1,634 ± 0,128 ^B	7,861
Proline (g)	0,961 ± 0,373	38,767	0,889 ± 0,270	30,368

The letter A,B in each colum show the significant different between Ac and Ri chicken ($P < 0.005$)

The amino acid content of Ac chicken meat is higher than that in Ri chicken meat.

Table 14: Sensoric test, grill loss of Ac, Ri and broiler chicken meat at 8. Weeks of age

Criteria	Ac chicken (n=10)		Ri chicken (n=10)		Broiler chicken (n=10)	
	X ± SD	CV%	X ± SD	CV%	X ± SD	CV%
Colour (note)	6,00 ± 1,41 ^A	23,57	7,50 ± 1,43 ^B	19,12	8,10 ± 0,74 ^C	9,11

Smell (note)	7,50 ± 1,27	16,92	7,60 ± 0,70	9,20	7,30 ± 1,06	14,51
Tast (note)	8,60 ± 0,52 ^A	6,00	7,4 ± 1,17 ^B	15,86	6,80 ± 1,62 ^C	23,81
After eating (note)	6,67 ± 1,21	18,16	7,16 ± 1,17	16,31	6,83 ± 0,98	14,39
Grill loss %	19.72 ± 1,38 ^A	7,02	22,15 ± 1,00 ^B	4,52	26,79 ± 0.96 ^C	3.59

The letter A,B,C in each colum show the significant different between Ac, Ri and Broiler chicken. ($P<0.05$).

Ac chicken meat is more diclicious than Ri and broiler chicken.

No significant differences for pH value between male and female of Ac chicken were found ($p>0.05$). These value is normal in comparision with other chicken meat.

Table 15: pH value and colagent content of Ac chicken meat (24 hours after slaughtering)

Criteria	Male (n=15)		Con m,i (n=15)	
	X ± SD	CV%	X ± SD	CV%
Breast meat	6,00 ± 0,18	3,07	5,98 ± 0,18	2,99
Thigh meat	6,27 ± 0,22	3,51	6,36 ± 0,19	3,04
Colagent (%)	8,23 ± 1,40	16,98	8,51 ± 1,25	14,75

Table 16 : Fatty acid content of Ac chicken meat at 8. Weeks of age (% of total fatty acid)

	Thigh meat		Breast meat		Thigh meat at 5.weeks of age of broiler (Lopez-Ferrer et al. 1999)
Fatty acid	Mean	Min – Max value	Mean	Min – Max value	Concentrate food added 8% of sunflower oil
C12:0	0.05	0.02 - 0.11	0.083	0.02 – 0.20	-
C14:0	0.08	0.01 - 0.17	0.23	0.18 – 0.30	1.06
C16:0	7.76	0.87 - 15.1	13.31	9.31 – 17.94	18.25
C18:0	6.36	1.73 - 14.51	10,24	6.89 – 15.13	4.28
C20:0	0.08	0.06 - 0.11	0,27	0.16 – 0.43	-
C24:0	0.20	0.10 - 0.66	0,21	0.12 – 0.36	-
C14:1	0.01		-		-
C16:1	0.49	0.14 - 0.9	0,87	0.28 – 1.51	-
C17:1	0.05	0.05 - 0.1	0,20	0.16 – 0.21	-
C18:1	14.37	3.64 - 34.78	24,78	14.97 - 34.59	19.38
C22:1	0.24	0.17 - 0.37			-
C24:1	1.86	1.26 - 2.34	2,30	1.03 – 3.99	-

C18:2	11.47	5.10 – 26.99	17,46	10.74 - 22.73	42.03
C20:4	2.93	0.24 - 8.19	3,94	1.14 – 7.33	2.80
C18:3w6	0.07	0.02 - 0.13	0,50	0.08 – 1.32	46.54
C18:3w3	0.16	0.03 - 0.31	0,37	0.29 – 0.43	4.98
C18:3w6/ C18:3w3	0.43	0.17 - 0.60	1,14	0.19 – 2.93	9.2
SAF	14.53	2.79 - 30.66	24.34	16.68 - 34.36	24.67
MUFA	17.02	5.27 - 38.5	28.15	16.44 - 40.29	24.79
PUFA	14.4	5.34 - 35.18	21.40	11.88 - 30.06	50.51

The data is analysed in Institut für Pflanzenbau und Pflanzenzüchtung I. Justus Liebig Universität – Giessen

The fatty acid of Ac chicken meat is varied. Outside these above fatty acid, we have found out a lot of another fatty acids in Ac chicken meat, but we have not enough standard fatty acid to read the name of them.

3. Conclusion

- . Ac chicken is the smallest chicken in comparison with other local chicken
- . The egg production of Ac chicken is very low (only 91.30-95.30 eggs/hen/year)
- . The egg weight of Ac chicken is also very small
- . The egg parameter of Ac chicken is normal, but the yolk is rather high
- . Ac chicken meat is a nourishing food for people:
 - + high protein content
 - + A lot of mineral (trace element).
 - + high amino acid content (including the essential amino acid)
 - + high fatty acid content (especially MUFA and PUFA)
 - + Collagen content in Ac chicken meat is high, that made Ac chicken meat more tasty than other chicken breeds meat.

The price of 1 kg of Ac chicken meat is higher than other one. That brings the benefit for the producer.

References

3. Bosch . H - 1969 - *Souci – Fachmann – Kauf – Die Zusammensetzung der Lebensmittel –* Wissenschaftliche Verlagsgesellschaft mbH Stuttgart - 1969
1. Bui Duc Lung , Tran Long - 1994 – *Conservation of Dong Tao and Mia chicken* – On the results of the livestock genetic conservation in Vietnam – Agricultural Publishing House - 1994
2. Bui Duc lung et al – 2002 – *Study on the characteristic of Ri chicken through 3 generation of selection.* Proceeding of national Workshop . September –2002 – Ha Noi – Vietnam
3. Le Thi Nga et al – 2000 – *Research results on meat performance of Kabir and F1 (Kabir x Chinese Yellow Chicken)* – Proceeding of national Workshop . April –2001 – Ho Chi Minh City - Vietnam
4. Nguyen Dang Vang et al-1998 - *Research results on productivity of Dongtao and F1 (Dongtao x Chinese Yellow Chicken)* – Proceeding of national Workshop . April –1998 – Hanoi - Vietnam
5. Pingel Heinz and H. Jeroch – 1980- *Biologische Grundlagen der Industriellen Geflügelproduktion* – VEB – Gustav Fischer Verlag Jena – 1980

- 6. Pingel Heinz – 2002:** Faustzahlen über Schlachtgeflügel - Jahr buch für Geflügelwirtschaft –2002 – Eugen Ulmer Verlag
- 7. Tran Long et al – 1994.** *Conservation of Ri chicken* – On the results of the livestock genetic conservation in Vietnam – Agricultural Publishing House - 1994
- 8. Tran Thi Mai Phuong –1999.** *Vergleich von Mastleistung, Schlachtkörper-und Produktqualität (Inhaltsstoffe) bei Ac und Ri Hühnern in Vietnam* – MSc Thesis.