

# RABBIT : A MICROLIVESTOCK OF PROMISE FOR INTENSIVE MEAT PRODUCTION

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**Abstract** - Microlivestock such as rabbit and chicken have a number of characteristics which are advantageous for the small land holders, subsistence type integrated farming and backyard food production. Somebody has correctly said livestock for use in developing countries should be like computers which are smaller and more personal. Poultry meat is regarded as wholesome, nutritious and cheap source of dietary protein. Currently rabbits have emerged as alternate meat source for the future. Rabbit meat has been regarded as the dieticians choice for the health conscious meat consumers. Rabbit meat is considered low in fat content in comparison to chicken, mutton, beef and pork. It is high in unsaturated fatty acids i. e. more than 60 % of the total fatty acids. Low sodium and cholesterol content is a boon to the heart and arteriosclerosis patients desirous of eating meat. Among the food animals rabbits have the highest reproduction rate. Rabbits can attain the growth rate comparable to modern broiler chicken. The amount of grain or concentrate fed to the rabbits is low in comparison to broilers. Rabbits can utilise considerable amount of roughages in the ration. Thus rabbit seems to have the potential as a competitive animal for economic meat production. Rabbit pelt and fur which is a important by-product supplements to the income of the farmers. A detailed review and comparison of the quantitative and qualitative meat production traits of rabbits and broiler chickens have been made in this paper.

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## INTRODUCTION

Poultry industry in India has expanded to a great extent in last two decades. It has become possible due to the efforts made by the poultry scientists in the field of breeding, feeding, management, disease control and post-harvest technology. A holistic package of practices have been developed for both small scale and large scale poultry rearing. The development of poultry industry is limited to some of the well defined poultry pockets. We have not been able to take poultry to hill areas, high altitude, tropical rain forest. Some difficulty has been felt with respect to formulating a package of practice for the above areas due to typical adaptive nature of the birds to dry regions and their feeding habits. Under these conditions rabbits can play an important role as non-conventional meat animals for the hilly, tropical rain forests, roughage, legumes and horticulture rich areas.

## ATTRIBUTES THAT RABBITS A MEAT PRODUCING SMALL LIVESTOCK IN DEVELOPING COUNTRIES.

- \* Small body size
- \* Short generation interval
- \* High reproduction rate
- \* Potential for year round meat production
- \* Rapid growth rate
- \* High genetic diversity in resource pool
- \* Ability to utilize non-competitive feed, forage, by-products
- \* Utilization of local resources for housing, management
- \* "Biological refregreators" for developing countries.

Rabbits are raised in different parts of world and in India as

- \* Laboratory animal
- \* Pets
- \* For meat, fur and wool
- \* Game animals
- \* Rex production.

There are 35 recognised rabbit breeds in world 6 rabbit breeds have been introduced in India.

China - 80% of the world total rabbit angora wool production.

Italy - 5.0% of the world total rexpelt production.

Meat - 5% of the world meat production.

Country	WORLD PRODUCTION	STATISTICS (1987)
	Rabbit meat production (tonnes/year)	Rabbit meat consumption (Kg/head/year)
EEC	57,0000	1.8
Italy	22,0000	3.8
France	15,0000	3.1
Spain	12,3000	3.3
Hungary	3,7000	1.2
Chekoslovakia	3,0000	1.76
Poland	2,5000	0.46
Belgium	1,6500	2.48

In India rabbits for meat and wool was introduced very recently in 1984. Rabbits were imported from West Germany, Russia, Newzealand.

- |                            |   |
|----------------------------|---|
| * Soviet Chinchilla        | * Russian Angora                                  |
| * Grey giant               | * German Angora                                   |
| Meat * White giant         | Wool * Russian fur Chinchilla                     |
| * New Zealand White        |   |
| * Dutch <sup>a</sup>       | * Colour lines <sup>a</sup> developed by breeding |
| * Black Brown <sup>a</sup> |   |

a : Evolved in India

#### Rabbit rearing pockets in India

- |                              |                  |
|------------------------------|------------------|
| * Himachal Pradesh           | * Andhra Pradesh |
| * Jammu and Kashmir          |                  |
| * Hills of utter pradesh     |                  |
| * Maharastra                 |                  |
| * Kodai Hills of Tamil Nadu. |                  |
| * Kerala                     |                  |
| * North - East States        |                  |

100 doe units are normally preferred by farmers. In hills mushroom and rabbit meat, wool production have been undertaken by farmers. Rabbit Production on horticultural waste has become very popular. Apple pomace, pineapple. Jack fruit, citrus and vegetable wastes are very good source for the rabbit farming.

Microlivestock such as rabbits and chicken have a number of characteristics which are advantageous for small land holders.

Subsistence type integrated farming and backyard food production.

Some body has correctly said livestock for use in developing countries should be like computers which are smaller and more personal.

Among the meat animals rabbits have the highest reproduction rate, rabbit can attain the growth rate comparable to modern broiler chicken. The amount of grain or concentrate fed to the rabbits is low in comparison to broilers. Rabbits can utilise considerable amount of roughages in the ration. Thus rabbits seems to have the potential as a competitive animal for economic meat production.

In developing countries rabbits and chicken are considered as "Biological Refregeraters", in which meat is stored live until needed.

Poultry meat is regarded as wholesome, nutritious and cheap source of dietary protein. Currently rabbits have emerged as meat source for the future. Rabbit meat has been regarded as the dieticians choice for the health

conscious meat consumers. Rabbit meat is considered low in fat content in comparison to chicken, beef and pork (CHEEKE, 1980). Rabbit meat is high in unsaturated fatty acids i. e. more than 60% of the total fatty acids. Low sodium and cholesterol content is a boon to the heart and arteriosclerosis patients desirous of eating meat.

The aim of this review was to study and compare the quantitative and qualitative meat production traits of rabbits and broiler chicken. Data have been collected and tables have been made for a detail comparison.

Sl. No.	Contents of Table
1.	Performance levels and attributes.
2.	Main products of conventional animal farming.
3.	Efficiency value "E" of progeny and parent stock.
4.	Efficiency value "E" of weaned animals.
5.	Efficiency value "E" in terms of land use.
6.	Relative crop and animals production efficiency per unit land.
7.	Comparative water requirement.
8.	Nutrient composition of ration.
9.	Feed conversion Ratio.
10.	Carcass traits.
11.	Primal and retail cut yield.
12.	Carcass yield and composition.
13.	Proximate composition.
14.	Vitamin content.
15.	Mineral content.
16.	Amino acid composition.
17.	Partitioning of fat depots.
18.	Cholesterol content.
19.	Fat composition.
20.	Fatty acid composition.
21.	Frankfurter acceptability.

**Table 1 : Performance levels and attributes**

Species	• Mature size • (Kg live weight)		• Reproductive • rate • (No. of youngs • per year)	• Ratios of • male to • female • for • breeding	• Yield • from • progeny • in (Kg- • carcass • weight).
	• Male	• Female			
Hens	4.0	3.0	108	1:10	1.45
Duck	4.5	4.0	110-175	1:5-8	2.0
Geese	5-10	4.5-9	25-50	1:2-6	4-5
Turkey	13-23	8-12	40-100	1:10-15	3-9
Rabbits	4.0-7.2	4.5-7.6	30-50	1:15-20	1-2

Source : SPEDDING and HOXEY (1974)

**Table 2 : Main products of conventional Micro livestock**

Species	• Products					
	Meat	Egg	Skin	Fibre	Feathers down	Falees
Chicken	+	+	-	-	+	+
Duck	+	+	-	-	+	+
Geese	+	+	-	-	+	+
Turkey	+	+	-	-	+	+
Rabbits	+	-	+	+	-	+

TURNER H. N. (1971)

**Table 3 : Efficiency value "E" for Progeny and parent stock**

Species <sup>b</sup>	"E"	Value <sup>a</sup>
Hen	14.6	(MORRIS, 1971)
Rabbit	8.0	(WALSINGHAM, 1972)

<sup>a</sup> Efficiency values "is the energetic efficiency with which normal population of the livestock species convert the feed on which they commonly produce  
 $E = \frac{\text{Total energy in carcass produced} \times 100}{\text{Cross energy in feed for progeny and proportion}}$

<sup>b</sup> Based on : 1 buck to 15 does each producing 40 progeny per year (Rabbits)  
 1 cock to 10 hen producing 108 progeny per year.

**Table 4 : Efficiency values "E" for independent i.e. weaned livestock**

Species	"E" values
Hen	16.0
Rabbit	12.5 - 17.5

$E = \frac{\text{Total energy in carcass} \times 100}{\text{Cross energy in feed from independence to slaughter.}}$

Source : MORRIS (1971), WALSINGHAM (1972).

**Table 5 : Efficiency value "E" for land use in production**

Species	"E" <sup>a</sup> value
Poultry / Chicken	852
Rabbits	932

<sup>a</sup>  $E = \frac{\text{Kg. Carcass}}{\text{Hectre land}}$

Source : WALSINGHAM, 1972

**Table 6 : Relative crop and animal production efficiency per unit land**

Product harvested	Protein (Kg/Ha/Yr)	Energy (MJ/Ha/Ye)	References R
Chicken broiler	92	4600	1
Rabbit carcass	180	7400	2
Rice	320	87900	3
Wheat	350	58600	4
Maize	430	83700	5
Potato	420	100400	6
Cabbage	1100	33500	7
Dried grass	700 - 2200	9200 - 218000	8

- HOLMES W., 1970. *Proc. Nutr. Soc.*, **29** (2), 237.
- WALSINGHAM J. M., 1972. Ecological efficiency studies -I Production from rabbits. *G.R.I. Technical Report*, No.12.
- , 4., 5. FAO Production year Book, 1970. No.24 FAO, *Nutrition Studies*, No. 24,
- HOLMES W., 1970. *Proc. Nutr. Soc.*, **29**(2), 237.
- do-----
- COSTLE M. E. and HOLMES W. (1960). *J. Agric. Sci. Camb.*, **55**:2

**Table 7 : Comparative water requirement**

Species	Liveweight	Environment	Water ("L" Unit/ live weight)	required 100 Kg. / day
Hens <sup>a</sup>	2-3	Housed	dry diet	7-35
Rabbits <sup>b</sup>	2.5	Housed	dry diet	6

Source : <sup>a</sup> Tyler (1958)  
<sup>b</sup> Kennaway (1943)

**Table 8 : Nutrient composition of ration**

Nutrients	Rabbit ration	Broiler ration
Protein (%)	16	22
Ether extract (%)	2	6
Fiber (%)	20	5
Calories (K cal/gm)	3.59	3.54

Source : REDDY N. V., ROA D. R. and CHEN C.P. (1977). *Nutr. Rep. Int.* 16 (1):133-138.

**Table 9 : Feed Consumption and conversion**

Age	Feed Consumption (g)		Feed	Gain (Ratio)
Weeks	Rabbits	Broilers	Rabbits	Broilers
0-2	428 ± 74	389 ± 28	3.81 ± 0.77	1.69 ± 0.08
2-4	857 ± 125	997 ± 40	2.26 ± 0.63	2.24 ± 0.25
4-6	1150 ± 66	1404 ± 33	2.17 ± 0.28	2.53 ± 0.30
6-8	1404 ± 98	1652 ± 74	2.88 ± 0.60	3.40 ± 0.51
0-8	3840 ± 149	4442 ± 79	2.45 ± 0.25	2.51 ± 0.14

Source : REDDY et al., 1977

Figure : 1, 2, 3, indicating Growth curve, Feed Protein efficiency in rabbit and broilers.

Figure 1 : Logarithmic plots of live weights of rabbits and broilers

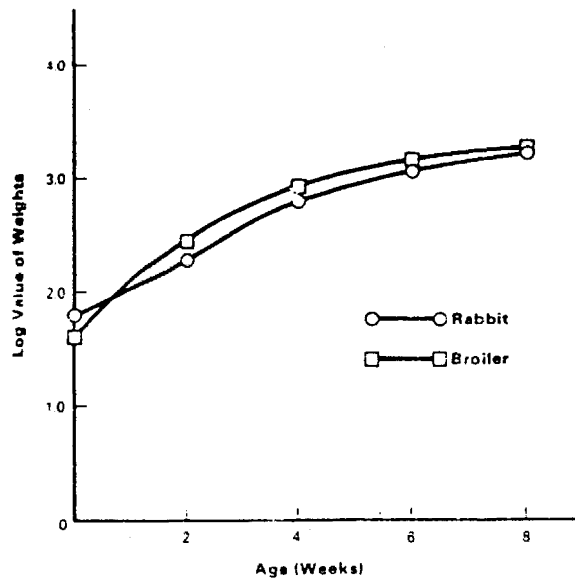
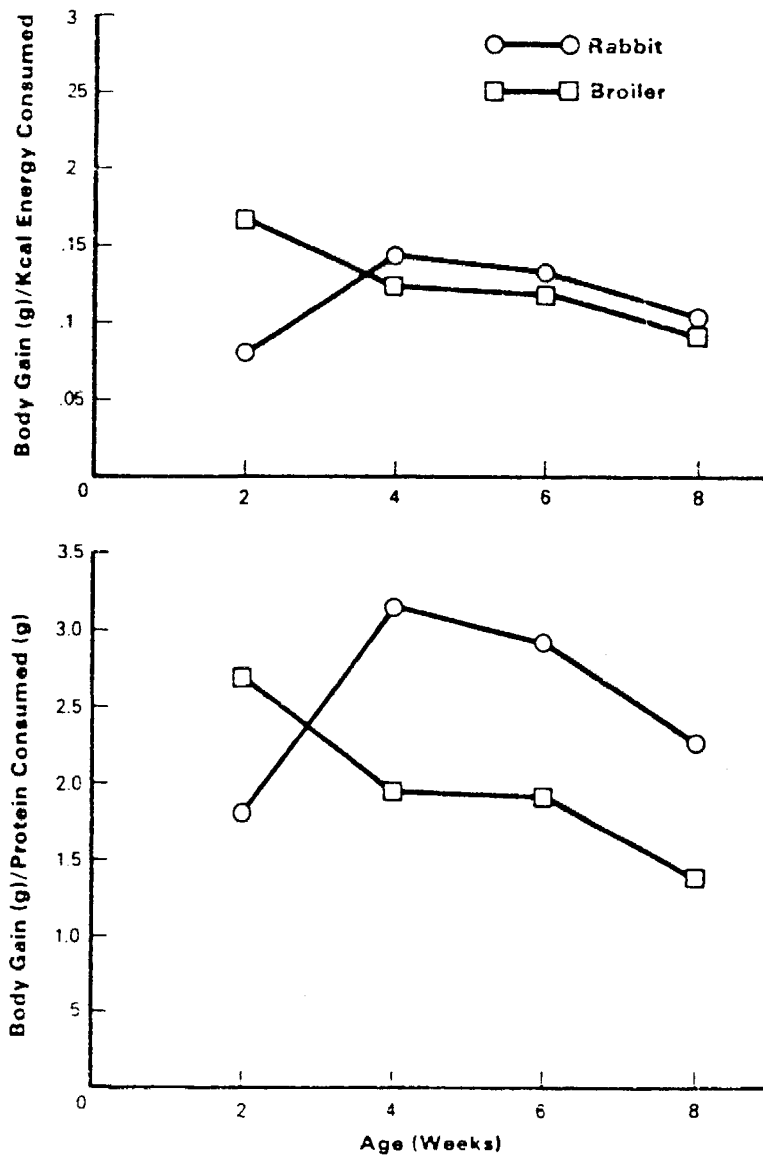


Figure 2 : Efficiency of feed protein and feed energy utilization by rabbit and broiler



**Table 10 : Carcass Traits**

Traits	Broiler	Chicken <sup>a</sup>	Broiler Rabbit <sup>b</sup>
Slaughter Age (Weeks)		6	12
Slaughter weight (Kg)		1.500	2.000
Carcass yield (%)		65	48
		(including giblets)	
Giblets (%) (Heart, Liver and / or Gizzard)		4.0	3.5
Blood (%)		4.0	4.0
G.I. tract with gut fill (%)		18.5	22.0
Feather / Skin (%)		6.0	12.0
Head (%)		2.0	5.0
Shank / Hind, Fore limb, Tail (%)		4.5	4.5
Lungs, Trachea, Diaphragm (%)		-	1.5

Source : <sup>a</sup> POSATI L. P. (1979)  
<sup>b</sup> PRASAD and SAHU (1988)

**Table 11 : Primal and Retail cut yield (%)**

Traits	Chicken <sup>a</sup> Primal	Broiler <sup>a</sup> Retail	Rabbit Primal	Broiler <sup>b</sup> Retail
Hind legs	34.1	-	27.9	-
Thighs	-	18.1	-	21.5
Drumsticks	-	16.1	-	6.4
Loin	-	-	27.2	-
Short loin	-	-	-	17.6
Pelvis	-	-	-	9.2
Flanks	-	-	8.4	-
Breast and Ribs	17.0	-	18.9	-
	(Black & Ribs)			
Breast	25.4	-	-	2.7
Ribs	-	-	-	3.6
Neck	3.5	-	-	6.4
Back	-	-	-	6.2
Forelegs/Wings	13.3	-	17.6	-
Shoulders	-	-	-	9.1
Arms	-	-	-	5.7
Fore arms	-	-	-	2.5
Giblets	6.7	-	-	3.5
	(Gizzard, Liver, Heart)			(Liver, Heart, Head me.)
Processing loss	1.0	-	-	1.1
Carcass skin	9.5	-	-	--
	(Included in carcass)			(Skinned)

Source : <sup>a</sup> POSATI L. P. (1979); <sup>b</sup> SAHU and PRASAD (1990)

**Table 12 : Carcass yield and composition**

Traits	Chicken	Rabbits
Carcass yield (%)	61.0	48.0
Meat (%)	62.0	68.3
Bone (%)	34.0	17.4
Fat (%)	14.0	6.0
Protein (%)	18.6	18.5
Fat (intramuscular)	7.0	7.4
Moisture (%)	68.0	71.0

Source : <sup>a</sup> POSATI L. P. (1979)  
<sup>b</sup> SAHU and PRASAD (1990)

**Table 13 : Meat Proximate Composition<sup>a</sup> (%)**

Nutrient	Chicken broiler <sup>b</sup>	Rabbit broiler
Water (%)	65.99	71.0
Protein (%)	18.60	18.5
Ash (%)	0.799	0.64
Total Lipids (%)	15.06	7.4
Carbohydrate (%)	0.00	0.00
Caloris (%)	215	136
Fiber (%)	0.00	0.00

<sup>a</sup> Per 100 gm edible Portion  
<sup>b</sup> Flesh and Skin included

**Table 14 : Vitamin content<sup>a</sup>**

Nutrient (mg)	Chicken Broiler <sup>b</sup>	Rabbit Broiler
Ascorbic acid	1.6	-
Thiamine	0.06	0.11
Riboflavin	0.12	0.37
Niacin	6.80	2.12
Pantothenic acid	0.91	0.01
Pyridoxine	-	0.027
Vit B6	0.35	-
Folacin (mcg)	6.0	-
Vit B 12 (mcg)	0.31	1.49
Vit A (RE = Retinol equivalent)	41	-
Biotin	-	0.28

<sup>a</sup> Per 100 grams edible portion

<sup>b</sup> Flesh and skin included

**Table 15 : Mineral Content<sup>a</sup>**

Nutrient (mg.)	Chicken broiler <sup>b</sup>	Rabbit broiler
Iron	0.90	2.9
Calcium	11.0	13.0
Magnesium	20.0	14.5
Phosphorus	147	-
Potassium	189	200
Sodium	70	59.3
Zinc	1.31	5.4
Copper	0.48	-
Manganese	0.019	-

<sup>a</sup> All values per 100 gm edible portion

<sup>b</sup> Edible portion means includes both flesh and skin

Source : PORTSMOUTH (1977), CHEEKE et al., 1982

- REISER R., 1975. Fat has less cholesterol than meat (lean). *J. Nutrition*, **105**, 15-16.
- HOLMES Z. A., WEI S. F., HARRIS D. J., CHEEKE P. R., PATTON N. M., 1984. *J. Anim. Sci* **58**, 62.
- RAO D. R., CHAWAN C. B., CHEN C. P., SUNKI G. R., 1979. Nutritive value of rabbit meat : Potentials, Problems and current research PP 53-59, Oregon State University press. Corvallis.

**Table 16 : Cholesterol Content**

Meat Source	Fresh weight basis	Dried weight basis	Reference
Chicken breast	79	-	1
Chicken drumsticks	91	388	2
Rabbit	75	288	3
Rabbit	39	136	4

<sup>a</sup> All values in mg/100 gm sample

-. = Not available

**Table 17. Aminoacids Composition of meat**

Aminoacids	Chicken Broiler	Rabbit Broiler
Arginine	6.7	4.8
Cystine	1.8	-
Histidine	2.0	2.4
Isoleucine	4.1	4.0
Leucine	6.6	8.6
Lysine	7.5	8.7
Methionine	1.8	2.6
Phenyl alanine	4.0	3.2
Threonine	4.0	5.1
Tryptophan	0.8	-
Tyrosine	2.5	4.6
Valine	6.7	-

<sup>a</sup> Amino Acids expressed as percentage of protein

**Table 18 : Partitioning of Fat Depots**

Traits	Broiler Chicken <sup>a</sup>	Broiler Rabbit <sup>b</sup>
Age (days)	70	70
Empty Body weight (gms)	1900	1900
Total Fat (gms) separable	133	88
Skin (gms)	266	-
Subcutaneous Fat (gms) (Neck, 25 ; Thigh, 16 ; Back, 12 Sartorial, 8 ; Breast 5 ; Proventriculus, 5 ; Bursa fabricious, 3)	73	30
Perirenal Fat (gms)	2	18
Abdominal fat pad/ Intermuscular Fat (gms)	57	12
Mesenteric Fat (gms)	7	13
Crop fat (gms)	4	-
Pericardium Fat (gms)	2	1

Source :

<sup>a</sup> NIR I., NITSAN Z., KEREN Z. VI S., 1988. Fat Deposition in birds in : Leanness in Domestic birds.

Edt : LECLEARES D., WHITEHEAD C. C., Butterworths, London, 141-174 pp.

<sup>b</sup> SAHU and PRASAD, 1988

Table 19 : Fat Composition

Lipid Traits	Chicken <sup>a</sup>	Rabbit
Total fat (gms/100 gm edible portion)	15.06	7.4
Saturated fat (gms/100 gm total lipid)	29.9	32.0
Mono-unsaturated fat (-do-)	44.7	65.7
Poly unsaturated fat (-do-)	21.0	
Cholesterol (mg/100 gms)	75.0	39.0

<sup>a</sup> POSATI, 1979

<sup>b</sup> CEEKE, 1987

Table 20 : Fatty Acid Composition of Carcass Fat

Fatty Acids	Rabbits			Chicken	
	RI	R2	R3	R4	
				Male	Female
Myristic (14:0)	3.2	4.4	1.9	1.1	1.1
Palmilic (16:0)	27.4	40.2	23.6	22.6	24.1
Palmitoleic (16:1)	3.9	6.8	5.2	7.1	8.3
Stearic (18:0)	6.3	6.7	6.1	11.9	9.5
Oleic (18:1)	31.2	26.0	12.7	31.7	32.5
Linoleic (18:2)	22.5	10.1	8.9	22.5	21.6
Linolenic (18:3)	5.2	5.0	3.9	2.1	2.2
Total sturated	37.0	51.0	32.0	29.9	-
Total unsaturated	63.0	49.0	68.0	65.7	-

Table 21 : Frankfurter Acceptability

Traits	Chicken Franks		Rabbit Franks	
Type of meat	Chicken		Rabbit.	
Type of fat	Pork		Pork	
Analysis of finished Frank furters :				
Fat (%)	26.0		28.5	
Moisture (%)	59.4		55.6	
Heating loss (%)	15.5		12.0	
Sensory Traits	Cold	Hot	Cold	Hot
Shear valus (Kg/Cm <sup>2</sup> )	0.98	0.96	1.04	1.13
Tenderness	5.77	7.43	5.88	6.25
Juiciness	5.09	7.29	5.04	6.30
Flavour	5.32	6.46	5.52	5.77
Overall Acceptability	5.54	6.61	5.49	5.79

Source : BAKER R. C., DARFLER J. M., VADEHRA D. V., 1972. Acceptability of Frankfurters made from chicken, Rabbit beef and pork. *Poultry sci*, 51, 1210-1214.



## REFERENCES

- CASTLE M.E., HLOMES W., 1960. *J. Agric. Sci., Camb.* **55**, 2.
- CHEEKE P. R., 1987. Rabbit feeding and nutrition, Academic press, INC. Animal Feeding and nutrition, A Series of monograph and treaties. Har court Brace, Jovano vich publishers.
- CHEEKE P.R., 1986. Potentials of rabbit production in tropical and subtropical agricultural system. *J. Anim. Sci.*, **63**, 1581-1586.
- CHEEKE P.R., PATTON N. M., TEMPLETON S.G., 1932. Rabbit production. The Inter State printer and publisher, INC, Danville, Illinois.
- F.A.O., 1970. F.A.O. Production year Book No. 24.
- F.A.O., 1970. Nutrition studies, No. 24.
- HOLMES W., 1970. *Proc. Nut. Soc.*, **29(2)**, 237.
- KENNAWAY E.L., 1943. *Br. Med. J.*, **1**, 760.
- MORRIS T.R., 1971. Ibid:Spedding and Hoxey, 1975.
- NIR I., NITSAN Z. KEREN-Z vi S., 1988. Fat deposition in birds in : Leanness in domestic birds, Edt. LECLEREG D., White head C. C., Butter worths, London 141, 174 p.p.
- ORLANDO J.M., VEDEHRA D.V., 1972, Acceptability of Frankfurters made from chicken, rabbit. *Beef and Pork, Poultry Sci.* **51**, 1210-1214.
- PATTON N. M., 1984. *J. Anim. Sci.* **58**, 62.
- PORTSMOUTH J., 1977. The nutrition of rabbits, in : Nutrition and the climatic environment, ed : HARESIGN W., SWAN H., LEWIS D., BUTTERWORTHS, London, 93-113 p.p.
- POSATI L.P., 1979. Composition of foods. 1. Poultry products, Raw, Processed, Prepared, USDA Agriculture Hand Book, 8-5, 330 p.p. Washington D.C.
- PRASAD V.S.S., SAHU B.B., 1988. Carcass and meat quality traits of Soviet Chinchilla fryers fed diets with animal meals. *Indian J. Anim. Sci.*, **59(10)**, 1354-1359.
- RAO D. R., CHAWAN C.B., CHEN C.P., SUNKI G.R., 1979. Nutritive value of rabbit meat : Potentials, Problems and current research. p.p. 53-59. Oregon state university press, Corvallis.
- REDDY N.V., RAO D.R., CHEN C.P., 1977. *Nutr. Rep. Int.* **16(1)**, 133-138.
- REISER R., 1975. Fat has less cholesterol than lean. *J. Nutrition*, **105**, 15-16.
- SAHU B.B., PRASAD V.S.S., 1990. Growth performance of Soviet Chinchilla fryers fed on rations with animal meals. *Indian J. Anim. Sci.*, **60(2)**, 211-218.
- SAHU B.B., PRASAD V.S.S., PATNAYAK B.C., 1990. Increasing Profits by pelleting rabbit feed at home. *Indian Farming.* **40(2)**, 10-13.
- SPEDDING C.R.W., HOXEY A.M., 1975. The potential for conventional meat animals. In : *Meat Edt : COLE D. J. A. and LAWRIE R. A., Butterworths & Co Ltd., London, 88, 483-506* p.p. Kingsway WC 2B 6AB.
- TAYLER J.C., 1970. *J. Br. Grassld. Soc.*, **25 (2)**, 130.
- TURNER H.N., 1971. Out look on Agriculture **6 (6)**, 254.
- WALSINGHAM J.M., 1972. Ecological efficiency studies-1. Meat Production from Rabbits. *G. R. I. Technical report* No. 12.