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Integrated Contract Broiler Farming: An Evaluation Case Study in India

A MEAS Evaluation Study (short version)

June 2015

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Abstract

This project evaluated integrated contract and non-contract broiler farming systems in India's Karnataka, Telangana and Andhra Pradesh states by applying Bennett's hierarchy of evaluation model. The data, collected in 2014 from the three states, came from in-depth personal interviews with 120 contract and 120 non-contract broiler farmers and the FGD with stakeholders. The overall findings indicated that though production cost was significantly low, the total returns were also significantly low in contract broiler farming (CBF) because efficiency surplus is largely taken by contract companies. On the other hand, though production cost was high, farmers in non-contract broiler farming (NCBF) were gaining a margin of Rs. 5.99 per bird despite facing investment, production and marketing risks. This leads to the conclusion that contract and non-contract farmers incur significantly different production and marketing costs and earn different marketing margins. The extreme standard deviations on returns under both systems confirm that CBF does not enable contract farmers to make better profits than non-contract farmers; rather, it gives a lower but assured and almost fixed return. Despite low returns, farmers are participating in CBF largely because of low input costs, assured income, and the absence of marketing risk. On the other hand, through improved technology, low margins on inputs, economy of scale and stringent norms, the companies are reducing production cost, leading to lower retail chicken prices for consumers. All these factors resulted in successful value chain development through CBF. Nevertheless, in the absence of a regulatory body, all privileges and rights were in the hands of contract companies. With meager rearing charges, stringent production cost incentives and penalties, the agreements clearly favored the contract companies.

The survey and FGD findings revealed that the value chain development and provision of inputs and extension advisory service (EAS) by large private poultry companies did not really result in a win-win situation for both integrators and farmers. To make CBF profitable to the companies and to benefit farmers, the specific policy interventions suggested and discussed include: further promotion and regulation of CBF farming through an authoritarian body; enhancement of rearing charges and increase in rate incentive norms to transfer part of market margins to the contract farmers; increased numbers of batches per year by contract farmers; transparency in executing contract agreements; more government support to CBF and NCBF and to other small farmers for equitable and inclusive development; and replication of the EAS model of CBF/NCBF in other sectors as an example of modernization of EAS through the private sector's participation to develop entrepreneurship among farmers.

Background

Broiler poultry farming and development require plans, targets, budgets, technology, material aid, extension advisory services (EAS), as well as experts and organizations to govern them. Through broiler poultry farming, farmers help themselves to attain economic and social development. By following this exactly, India within five decades has emerged as a global key player in this sector. Broiler poultry farming is one of the fastest growing sub-sectors of Indian agriculture today with an annual growth rate of 11.44 percent, 3.725 million tons of production, and employing 4.29 million people (Index Mundi, 2015). India is the fourth largest producer of poultry meat in the world – valued at 6.6 billion USD – and accounts for about 0.66 percent of India's GDP and 7.72 percent GDP from the livestock sector (Prabakaran, 2014; Rajendran et al., 2014).

A farmer interested in broiler poultry farming has two options:

- a. *Non-contract broiler farming (NCBF)*: In this case, the farmer has to bear all the expenses, such as EAS, procurement of chicks, feed, medicines, vaccines, overhead farm expenses (labor, electricity, water, litter material, farm disinfection, etc.), medical costs, transportation, etc. He has to admit all the three risks, investment risk, production risk and market risk.
- b. *Contract broiler farming (CBF)/ Integration*: In this case, the integrator provides EAS, chicks, feed, medicines and vaccines. The farmer provides labor, shed, electricity, water, litter material, equipment and miscellaneous services. The farmer as a caretaker gets a predetermined rearing charge (RC) that is mentioned in the contract. The farmer is also rewarded for surpassing the set standards and penalized if any of the agreed criteria are not met. The contractor bears the investment (inputs) and market risk. The contractor is also relieved of his biggest threat from disease outbreak as his millions of birds are reared under different locations that too in small numbers by several small farmers.

The extension advisory and input services under CBF and NCBF are described in Box 1.

Box 1 : Extension Advisory and Input Services under CBF and NCBF

A. Extension Advisory and Input Services under CBF

The extension advisory and input services are integrated in CBF and provided together as a complete package. The EAS in CBF are free and includes general farm management practices and specific management practices related to chicks, feed and medication. The input services in CBF include provision of chicks, feed, medicines and vaccines. The extension advisory and input services are usually provided by line supervisors who visits the farm daily (except on Sundays and public holidays). The line supervisors are not poultry veterinarians, but are graduates trained in poultry farm operations by company for two to three months. A veterinarian from the company visits the farms only in case of disease outbreak or unusual mortality is reported. The EAS suggested and recorded in farm records by the line supervisors should be followed by contract farmers without fail. A complete and accurate farm record keeping system followed by all farmers as well as line supervisors is a significant feature of CBF. The individual farm performance details like mortality, FCR, growth, feed consumption, medicines and vaccines administered, etc. are recorded daily in record books. Submission of record books by the farmer to the company is required at the time of flock liquidation.

General EAS - advocated, verified and recorded

- Preparation of shed, fumigation and disinfection before arrival of chicks as per company norms.
- Ventilation of shed and feed room.
- Strict bio-security measures - cleanliness, foot dip, dead-pit and fencing.
- Water and sanitization - water quality, pH and water sanitizer name and dose.
- Cleaning of water tank and drinkers twice in a week and water pipes once in a week.
- Litter management - racking daily, keeping litter dry with less than 20 percent moisture level.
- Summer and winter management practices.

Specific EAS on chicks - advocated, verified and recorded

- Supply of chicks.

- Adequate brooding management with parameters like space per chick, litter quality, source of heat, number of brooders/feeders/drinkers and their quality, side and ceiling curtains and their height management.
- Chicks' uniformity recording - number of chicks weighed, minimum weight, maximum weight, average weight, and variation.
- Separation of small and weak chicks at the end of first week for special care with more water, feed and vitamins.
- Daily mortality of chicks/birds (number and percent) with reason(s).

Based on identified reason(s), farmers are advised suitable management practices/medication to maintain flock uniformity, good feed conversion ratio (FCR), reduce mortality and avoid delayed growth.

EAS on feed - advocated, verified and recorded

- Supply of starter, grower and finisher feed to fulfill various needs - environmental, age and productivity conditions.
- Feed and light restriction.
- Feeding schedule, every day feed intake analysis and matching with standard body weight.
- Based on sample weight of five percent birds, weekly recording of actual mortality, feed intake, body weight and FCR to note the deviations from their corresponding standard values.

Based on comparison, farmers are advised suitable remedies to match with the standards.

EAS on Medication - advocated, verified and recorded

- Supply of medicines, vaccines, antibiotics and growth promoters.
- Preventive vaccination and medicine schedules as a continuous practice.
- Shed cleaning, sanitization and dosage of sanitizer.
- Storage of vaccines, vaccination schedule/timing, correct and timely medication.

In addition, the company prints and distributes EAS literature to farmers on good management practices. To motivate farmers, company certifies the best performing farmers in every month under each contract farming branch. Company also conducts group training programmes, on-farm demonstrations and arranges peer trainings/exposure visits to best performing farms. At the time of chick placement, the gap between two batches is noted and at the time of flock liquidation, the batch is graded based on performance.

B. Extension Advisory and Input Services under NCBF

The extension advisory and input services are separate in NCBF. The farmer gets EAS from private poultry consultants and procures all inputs (chicks, feed, medicines and vaccines) from poultry companies/market on payment basis. The general management practices are taken care by farmers themselves based on experience. The EAS related to specific management practices on chicks, feed and medication are provided by qualified poultry veterinarians or government veterinarian on a payment basis. The payment is either for each visit or on contract per batch as a whole. They visit the farm whenever the farmer gives a call. The traditional hand record-keeping systems continue to work well in NCBF.

The CBF was introduced in Tamil Nadu during the early 1990s. Later it spread mainly to Karnataka, Andhra Pradesh, and Maharashtra and then to other states of India. The CBF has played a major role in the spectacular growth of the broiler sector, especially in structure, size and number of broiler farms in southern and western India. Earlier commercial broiler farms used to produce 200 to 500 chicks per cycle on an average; now, units with fewer than 5,000 birds are becoming rare, and units with 5,000 to 50,000 birds per cycle are common (Mehta et al., 2003). Though commercial farming can yield substantial gains, the transition from subsistence farming to market-driven broiler production is burdened with marketing risk (von Braun and Kennedy, 1994; Ramaswami et al., 2006).

Rationale for the Study

The poultry EAS in southern India had undergone significant change in the recent past due to CBF initiated by private companies. It is estimated that 37 percent of broiler production in India is under contracts, and about 78 percent of those contracts are concentrated in southern India (Rajajwani, 2012). Though CBF contributed to the rapid growth of the Indian broiler industry, the following research questions still need to be answered:

- Do contract and non-contract farmers incur significantly different production and marketing costs and earn different marketing margins?
- Does the provision of EAS by private CBF companies enable contract farmers to make better profits than non-contract farmers?
- Have assured markets, competitive price and guarantee against risk resulted in successful value chain development through CBF?
- Are the value chain development and provision of EAS by private CBF companies really a win-win situation for both integrators and farmers, or is it a socially acceptable way of exploiting the farmers?

To answer the above questions, a comparative evaluation study on CBF and NCBF was conducted with the following objectives:

- To assess demographics, physical and human resource inputs and EAS.
- To evaluate the technical and economic performance.
- To compare farmers' perceptions on inputs-outputs, EAS and strengths, weaknesses, opportunities and threats (SWOT).

Methodology

Research design: The study applied Bennett's hierarchy of evaluation model by adapting sets of methods (Bennett, 1976) (Table 1). Through individual surveys, this hierarchy evaluates CBF and NCBF systems, beginning at the bottom step with inputs and progressing to the top-end results. Though this model is useful for assessing inputs, activities, outputs, reactions, opinions and practice changes (levels 1-6), it is not rigorous enough to assess the end results at level 7 (Morford et al., 2006). To address this deficiency, the study employs SWOT analysis and focus group discussion (FGD) to supplement the survey data.

Table 1. Conceptual model depicting Bennett's hierarchy applied in the study.

Evaluation hierarchy	Measurement in the study	Indicators	Empirical measurement
Level 7 (end results)	Socio-economic changes and impacts	<ul style="list-style-type: none"> • SWOT parameters • FGD on: selection of contract farmers; terms and conditions applicable in CBF 	Open-ended questions
Level 6 (practice change)	Technical advices adoption	<ul style="list-style-type: none"> • Non-adoption, discontinuation, partial adoption and full adoption of technical advices 	Scale on four point continuum
Level 5 (KASA)	Farmers' perceptions	<ul style="list-style-type: none"> • Perceptions on inputs (chicks, feed, medicines and EAS) and outputs (broiler birds, manure value and payment system) 	Scale on five point continuum
Level 4 (reactions)	Farmers' feedback	<ul style="list-style-type: none"> • Factors of motivation to do CBF and NCBF • Reasons to change integrator (s) or input providers in the past two years 	Open-ended questions
Level 3 (outputs)	Technical and economic performance	<ul style="list-style-type: none"> • Broiler birds (flock size, mortality number, birds sold, sale age, sales rate, and birds lifting days) • Productivity (mortality percentage, birds sold, feed consumption and body weight) • Efficiency (FCR, sale age, weight gain/day) • Economics of inputs and outputs • EAS (frequency of information from various sources) 	Technical and economic performance index
Level 2 (activities)	Activities in CBF and NCBF	<ul style="list-style-type: none"> • Physical and human resource activities in CBF and NCBF 	Survey
Level 1 (inputs)	Personal characteristics of farmers	<ul style="list-style-type: none"> • Age, gender, education, social category, family and size, poultry occupation and experience 	Survey

Study locale and sampling: The study was conducted in India's Karnataka, Telangana and Andhra Pradesh states in 2014. These states were selected mainly because of their contribution to the poultry revolution, big contract firms in the region and huge presence of contract broiler farms - about 4600 in Karnataka and 6000 in Telangana and Andhra Pradesh states. Three districts each in Karnataka (Chitradurga, Davanagire and Shimoga), two districts in Telangana (Ranga Reddy and Warangal) and one district in Andhra Pradesh (Chittoor) were selected on the basis of the availability of both contract and

non-contract farms. From every district, 20 contract and 20 non-contract farmers were randomly selected to arrive at a total of 240 farmers from three states. The primary data was collected by personal interviews. To get the qualitative response, one FGD was conducted at Veterinary College, Shivamogga with stakeholders (two integrators, 14 farmers, three poultry consultants, four poultry academicians/researchers and three extension functionaries). The focus of FGD was on the criteria integrator used to select contract farmer and major terms and conditions indicated in the contract.

Survey instrument development, data collection and analysis: The interview schedule covering all the variables was developed and pre-tested with 15 contract and 15 non-contract farmers from a non-sample district in Karnataka state. On the basis of the pre-testing experience, the interview schedule was modified and duplicated for data collection. In all the districts, the respondents were interviewed personally at their respective poultry farms. The data obtained was coded, entered into a computer spreadsheet and analyzed using the SPSS version 17.0 (SPSS, 2008).

Results and Discussion

The findings of the case study are presented in seven levels as per Bennett's hierarchy.

Level 1: Inputs

Demographic characteristics: About two-thirds of contract farmers were 35 years or younger whereas the majority of non-contract farmers were in the young and the middle age categories. In both the systems, the majority of farms were owned by male farmers. The majority in both the groups had high school or higher education, but non-contract farmers were better educated. The majority non-contract farmers belonged to higher social class, i.e., general category, whereas the contract farmers belonged to backward castes. Both groups had extended families and indicated poultry farming was their secondary occupation. The non-contract farmers had significantly more experience in poultry farming than contract farmers (Table 2).

These results were similar to the earlier reports (Ramaswami et al., 2006; Thamizhselvi and Rao, 2010) who reported that the contract farmers had less experience in poultry farming and for most of the respondents it was a secondary occupation, thereby suggesting that CBF is a supplementary source of income from other sources. Integrators prefer to offer contract to the farmers who are less experienced in poultry production and thus likely to have lower bargaining power (Kumar and Anand, 2007). The findings on demographics also indicate that equity and social inclusion are the missing links in both CBF and NCBF. Women are only participating as laborers, but not the owners in both the systems. Also the ownership excluded disadvantaged communities in both the systems. For those who want an affirmative policy that favors the poor and socially disadvantaged, both the systems studied may not be the answer.

Table 2. Demographic characteristics of contract and non-contract farmers.

Demographics	Categories	CBF (n=120)	NCBF (n=120)
		Frequency (Percentage)	
Age (in years)	Young (25-35)	82 (68.3)	46 (38.3)
	Middle (36-45)	24 (20)	46 (38.3)
	Upper middle (46-55)	2 (1.7)	26 (21.7)
	Old (56-65)	12 (10)	2 (1.7)
	Mean / Range / SD	36.6 / 25-65 / 9.2	38.4 / 25-60 / 9.0
Gender	Male	114 (95)	113 (94.17)
	Female	6 (5)	7 (5.83)
Education	10th Grade	31 (25.83)	13 (10.83)
	12th pass	53 (44.17)	53 (44.17)
	Bachelor's degree and more	36 (30)	54 (45)
Social category	General	44 (36.67)	70 (58.33)
	Scheduled caste	8 (6.67)	7 (5.83)
	Scheduled tribes	12 (10)	5 (4.17)
	Other backward caste	56 (46.66)	38 (31.67)
Family type	Nuclear	4 (3.33)	11 (9.17)
	Extended	116 (96.67)	109 (90.83)
Family size	3-7	106 (88.33)	96 (80.0)
	8-12	8 (6.67)	19 (15.83)
	13-16	6 (5)	5 (4.17)
	Mean /SD	6.1 / 2.4	6.5 / 2.9
Poultry occupation	Primary	42 (35)	52 (43.33)
	Secondary	78 (65)	68 (56.67)
Experience	1 to 5 years	94 (78.3)	55 (45.8)
	6 to 10 years	22 (18.3)	35 (29.2)
	11 to 15 years	2 (1.7)	20 (16.7)
	16 to 28 years	2 (1.7)	10 (8.3)
	Mean / Range / SD	5.1 / 2-24 / 3.4	8.1 / 1-28 / 5.8
	t value (sig. (2-tailed))	4.919 (0.000)	

Level 2: Activities

Physical and human resource activities: The mean scores for number of batches/year (4.45) and use of family labor (0.78) of contract farmers were significantly ($p < 0.000$) lower than those of the non-contract

farmers. Mean scores of hired labor by contract farmers (1.33) were significantly ($p < 0.000$) higher than those of the non-contract farmers. This leads to the conclusion that contract farmers have more broiler sheds but fewer batches of chickens/year, and use less family labor and more hired labor (Table 3).

Earlier studies (Thamizhselvi and Rao, 2010) also pointed out that the number of batches under CBF was less than 5 which means loss to the farmer in terms of depreciation of the shed and equipment and underutilization of the labour. The results also indicate that basic economic resources are required in the form of fixed (for CBF and NCBF) and working capital (for NCBF) to participate, which the marginally poor farmers just do not have. This raises the issue if CBF/NCBF would be appropriate for resource-poor and small farmers.

Table 3. Physical and human resource inputs in CBF and NCBF.

Parameter	CBF (n=120)		NCBF(n=120)		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Number of sheds	2.39	1.25	2.31	1.19	0.528	.598
Number of batches/year	4.45	0.63	5.40	0.88	9.577	.000
Family labor	0.78	0.68	1.21	0.55	5.437	.000
Hired labor	1.33	0.81	0.83	1.04	4.146	.000
Total labor	2.10	0.93	2.03	1.10	0.507	.612

Level 3: Outputs (per batch)

The outputs in CBF and NCBF are presented under five sub-categories: broiler birds, productivity, efficiency (Table 4), economics (Table 5 and Table 6) and EAS (Table 7).

Broiler birds, productivity and efficiency: The average bird lifting days in CBF was significantly ($p < 0.006$) lower (1.98) than those of the NCBF (2.64). The average sale rate in CBF was significantly ($p < 0.000$) lower (65.17) than in NCBF (69.20). The mean score for birds' sale weight (kg) was significantly ($p < 0.000$) higher in CBF (2.41) than in NCBF (2.32). The mean scores for sale age (44.14) and weight gain (grams/day) (54.64) in CBF were significantly higher ($p < 0.005$ and 0.001 , respectively) than those in NCBF (43.23 and 53.73, respectively) (Table 4).

The decisions on the number of chicks to be supplied, time of lifting the birds, number of batches rest entirely on the contractor but not on the farmer, a major setback for the CBF farmer.

Table 4. Outputs per batch in contract and non-contract broiler farming.

Parameter	CBF (n=120)		NCBF(n=120)		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Broiler birds						
Chicks housed/flock size (no)	6645	3396	6170	3769	1.027	.305
Mortality (no)	313	265	272	246	1.249	.213
Birds sold (no)	6332	3224	5898	3580	0.988	.324
Birds lifting days (no)	1.98	1.13	2.64	2.34	2.772	.006
Sale rate (rupees/kg live weight)	65.17	4.09	69.20	3.90	7.814	.000
Productivity						
Mortality (%)	4.65	2.29	4.27	2.15	1.318	.189
Bird sold (kg)	15250	7794	13613	8048	1.600	.111
Feed consumed (kg)	27808	14839	25710	15245	1.080	.281
Birds' sale weight (kg)	2.41	0.19	2.32	0.16	4.022	.000
Efficiency						
FCR	1.81	0.09	1.81	0.12	0.123	.902
Sale age (days)	44.14	2.42	43.23	2.56	2.846	.005
Weight gain (grams/day)	54.64	2.35	53.73	1.98	3.235	.001

Among the input costs, the mean score for chick cost (24.13) in CBF was significantly ($p<0.000$) lower than that in NCBF (26.49). Among other costs, labor cost was significantly ($p<0.000$) higher in CBF, whereas bedding material ($p<0.000$), electricity ($p<0.000$), EAS ($p<0.000$) and miscellaneous ($p<0.002$) costs were significantly higher in NCBF. All the outputs - sale rate of birds, manure and feed bags - were significantly ($p<0.000$) higher in NCBF (Table 5).

The mean score for total cost of production in CBF (60.82) was significantly ($p<0.000$) lower than that in NCBF (63.14). On the other hand, the mean score for total returns in CBF (65.89) was significantly ($p<0.000$) lower than that in NCBF (70.68).

Overall, when input costs were included, the average net return per kg of live bird and per bird in CBF were Rs. 5.07 and Rs. 12.22; in NCBF, Rs. 7.54 and 17.49, respectively, with a significant ($p<0.000$) difference between them (Table 5).

Table 5. Economics of contract and non-contract broiler farming.

Input costs / returns (in rupees)	CBF(n=120)		NCBF (n=120)		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
(A) Costs						
Chick (per chick)	24.13	3.29	26.49	2.43	6.344	.000
Chick (per kg of bird)	10.05	1.44	11.50	1.18	8.513	.000
Feed (per kg)	26.11	1.97	26.52	2.18	1.525	.129
Feed (per kg of bird)	47.35	4.97	47.79	3.54	0.797	.426
Medicine (per kg of bird)	1.71	0.75	1.82	0.74	0.592	.554
Labor cost (per kg of bird)	1.00	0.48	0.46	0.52	8.335	.000
Bedding material (per kg of bird)	0.57	0.12	0.68	0.25	4.156	.000
Electricity (per kg of bird)	0.14	0.07	0.25	0.15	7.072	.000
EAS (per kg of bird)	0.00	0.00	0.52	0.25	22.885	.000
Miscellaneous (per kg of bird)	0.20	0.09	0.31	0.38	3.153	.002
Total cost (per kg of bird)	60.82	6.09	63.14	3.96	3.490	.001
(B) Returns						
Birds sale rate (per kg of bird)	65.18	4.08	69.20	3.90	7.793	.000
Manure sale (per kg of bird)	0.60	0.13	1.30	0.61	12.304	.000
Feed bags sale (per kg of bird)	0.12	0.05	0.18	0.10	5.591	.000
Total returns (per kg of bird)	65.89	4.13	70.68	3.88	9.242	.000
Net return / profit (per kg of bird)	5.07	4.14	7.54	5.09	4.119	.000
Average body weight (kg)	2.41	0.19	2.32	0.16	4.022	.000
Net return (Rupees/bird produced)	12.22	2.91	17.49	12.70	4.082	.000

To see the margins that contract farmers were losing to avoid marketing risk, economics were also separately worked out by excluding input costs and by including rearing charges. In this scenario, the mean scores for total costs and net returns per kg live chicken production in CBF were Rs. 1.91 and Rs. 4.59, respectively, and in NCBF, the corresponding values were Rs. 63.33 and Rs. 7.35. Overall in this scenario, the mean score for net return per bird produced in CBF was Rs.11.06 and, in NCBF, Rs. 17.05 (Table 6).

Table 6. Economics of contract and non-contract broiler farming (with rearing charges).

Parameter	CBF (n=120)		NCBF(n=120)	
	Mean	SD	Mean	SD
Costs				
Chick	-	-	11.50	1.18
Feed	-	-	47.79	3.54
Medicines	-	-	1.82	0.74
Labor	1.00	0.48	0.46	0.52
Bedding material	0.57	0.12	0.68	0.25
Electricity	0.14	0.07	0.25	0.15
EAS	-	-	0.52	0.25
Miscellaneous	0.20	0.09	0.31	0.38
Total costs	1.91	0.48	63.33	3.96
Returns				
Birds sale	-	-	69.20	3.90
Manure sale	0.60	0.13	1.30	0.61
Feed bags sale	0.12	0.05	0.18	0.10
Rearing charges (RC)	4.00	-	-	-
Incentives	1.78	0.80	-	-
Gross returns (RC + manure sale +feed bags sale + incentives)	6.50	0.80	70.68	3.88
Net return per kg live chicken (gross return – total costs)	4.59	0.96	7.35	5.09
Average body weight	2.41	0.19	2.32	0.16
Net return (rupees/bird produced)	11.06	2.91	17.05	12.70

The difference in net returns earned by CFs with and without variable costs indicated that they are losing a margin of Rs. 1.16 per bird produced by participating in CBF (Table 5 and 6). However, the standard deviations on returns indicates that the net returns in CBF are assured and almost fixed, while they vary widely in NCBF depending on the market rate (Table 6).

Extension advisory service (EAS): The integrator was the sole source (100 percent) of EAS in CBF. About 31.67 and 68.33 percent of contract farmers were very frequently and frequently getting EAS from the integrator, respectively. In case of NCBF, the main source of EAS was private poultry consultants (100 percent). However, self-service (45 percent), government veterinary doctor (on payment) (25.83 percent), government research station (4.17 percent) and government veterinary doctor (free) (4.17 percent) were mentioned as other sources of EAS.

Level 4: Farmers' Reactions

Factors of motivation to do CBF/NCBF: No market risk (100 percent), regular and quick returns (86.67 percent) and low working capital required (85 percent) were the top motivations to participate in CBF. Regular and quick returns (91.67 percent), high margins (85 percent) and ease of operation (73.33 percent) were the top motivations for farmers to do NCBF (Table 7).

Table 7. Motivations to do contract/non-contract broiler farming.

Motivation	CBF Frequency (%)	Rank	NCBF Frequency (%)	Rank
No market risk	120 (100)	1	38 (31.67)	9
Regular and quick returns	104 (86.67)	2	110 (91.67)	1
Low working capital required	102 (85)	3	-	-
Good market demand	98 (81.67)	4	82 (68.33)	4
Easy to operate	80 (66.67)	5	88 (73.33)	3
Good subsidiary occupation	78 (65)	6	69 (57.5)	5
Employment (self and family)	75 (62.5)	7	68 (56.67)	6
Manure for crops	53 (44.17)	8	62 (51.67)	7
High margins	36 (30)	9	102 (85)	2
Less land required	35 (29.17)	10	42 (35)	8
Chicken for home consumption	30 (25)	11	35 (29.17)	10
Alternative to less profitable agriculture	15 (12.5)	12	22 (18.33)	11

Change in integrator(s)/input providers and reasons for change: About 43.33 percent of contract farmers and 68.33 percent of non-contract farmers had changed integrator(s) and input provider(s), respectively, in the past two years. Low RCs (88.46 percent), not providing chicks for six batches (84.62 percent), and delay in chick delivery (76.92 percent) were the top reasons for changing the integrator(s) by contract farmers. Delay in chick delivery (90.24 percent), low quality feed (75.60 percent) and low FCR (70.73 percent) were the top reasons for changing input provider(s) by non-contract farmers (Table 8).

Table 8. Reasons for changing integrator(s) / input provider(s).

Reasons in CBF	Frequency (%) (n=52)	Rank	Reasons in NCBF	Frequency (%) (n=82)	Rank
Low rearing charges	46 (88.46)	1	Delay in chick delivery	74 (90.24)	1
Not providing chicks for 6 batches	44 (84.62)	2	Low quality feed	62 (75.60)	2

Reasons in CBF	Frequency (%) (n=52)	Rank	Reasons in NCBF	Frequency (%) (n=82)	Rank
Delay in chick delivery	40 (76.92)	3	Low FCR	58 (70.73)	3
Delay in lifting birds (> 2 days)	36 (69.23)	4	Low sale rate	34 (41.46)	4
Stringent production cost	30 (57.69)	5	High mortality	33 (40.24)	5
Low rate incentive	30 (57.69)	6	Payment delay	25 (30.48)	6
High penalty	28 (53.85)	7	Low quality EAS	20 (24.39)	7
Low FCR	26 (50.00)	8	High cost of EAS	20 (24.39)	8

Level 5: Knowledge, Attitudes, Skills and Aspiration- KASA

Farmers’ perceptions on inputs and outputs: Among the inputs, the mean perception score of contract farmers on EAS (32.05) was significantly ($p < 0.009$) higher than that of non-contract farmers (30.70). Overall, the mean perception score of contract farmers on total inputs (76.88) was significantly higher ($p < 0.050$) than that of non-contract farmers (75.05).

Among the outputs, the mean perception score of contract farmers with respect to payments received (2.56) was significantly ($p < 0.000$) lower than that of the corresponding score of non-contract farmers (2.86). The mean perception scores of contract farmers on broiler birds (2.98), manure (3.87) and total outputs (25.28) were higher than those of the corresponding scores of non-contract farmers (2.81, 3.43 and 24.48, respectively), and the ‘t’ values revealed significant differences ($p < 0.030$, $p < 0.000$ and $p < 0.011$, respectively) between them. Overall, the mean perception score of contract farmers on total outputs (25.28) was significantly ($p < 0.011$) higher than that of non-contract farmers (24.48).

On the whole, the combined mean perception score of contract farmers on inputs and outputs (102.15) was significantly ($p < 0.021$) higher than that of non-contract farmers (Table 9).

Table 9. Perceptions of farmers on inputs and outputs*.

Perception	CBF (n=120)		NCBF (n=120)		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Inputs**						
Chicks (10 items)	22.52	3.43	22.33	2.51	0.473	.637
Feed (4 items)	12.62	1.71	12.52	1.25	0.515	.607
Medicines (3 items)	9.68	1.53	9.49	0.89	1.178	.240
EAS (8 items)	32.05	3.42	30.70	4.49	2.617	.009
Total inputs	76.88	8.36	75.05	5.77	1.968	.050

Perception	CBF (n=120)		NCBF (n=120)		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Outputs **						
Broiler birds (2 items)	5.96	1.32	5.62	1.08	2.182	0.30
Manure (3 items)	11.61	0.86	10.28	1.49	8.460	.000
Payment received (3 items)	7.69	1.44	8.56	1.18	5.132	.000
Total outputs	25.28	2.48	24.48	2.33	2.579	.011
Overall Inputs + outputs)	102.15	9.87	99.53	7.42	2.331	.021

* Scale values: 1 = Extremely dissatisfied; 2= Dissatisfied; 3=Neither satisfied nor dissatisfied; 4=Satisfied, and ; 5=Extremely satisfied.

** Items (1) Chicks - cost, body weight, timely supply, strain, flock size, batches / year, growth rate, and gap between batches. (2) Feed – cost, quality, quantity, and FCR (3) Medicines - cost, quality, and quantity (4) EAS – applicability, understandability, frequency, timeliness, relevance, adequacy, usefulness, and technical knowledge of EAS provider (5) Broiler bird - number of birds produced and sold, live weight at sale (6) Manure - quantity produced, method of disposal, economic benefit (7) Payment received - rearing charges, regularity, and pricing method

Farmers’ perceptions on intention of EAS: The chi-square value (23.794) revealed a significant ($p < 0.000$) difference between contract and non-contract farmers in their perceptions on the intention of EAS in terms of information, knowledge, skill and attitude changes (Table 10).

Table 10. Perceptions of contract and non-contract farmers on intention of EAS.

Intention of EAS	Frequency (%)	
	CFs (n=120)	NCFs (n=120)
Provision of information only	19 (15.8)	32 (26.7)
Provision of information and knowledge	67 (55.8)	38 (31.7)
Provision of information, knowledge and skill	22 (18.3)	46 (38.3)
Provision of information, knowledge, skill and attitude change	12 (10.0)	4 (3.3)
Chi-square value and significance	23.794 ($p < 0.000$)	

Level 6: Practice Change

Adoption of technical advice: The mean adoption scores of contract farmers on recommended housing (2.32) and feeding (2.92) practices were higher than the corresponding scores of non-contract farmers (2.16 and 2.74, respectively), and the ‘t’ values revealed significant ($P < 0.008$ and $P < 0.000$) differences between them. The mean adoption score of contract farmers on medication practices (2.45) was significantly ($P < 0.010$) lower than the corresponding score of non-contract farmers (2.62). This indicate that technical advices related to housing and feeding were adopted more in CBF, but in NCBF advice on medication practices was more often adopted (Table 11).

Table 11. Adoption of technical advices by farmers.

Technical advice*	CBF (n=120)		NCBF (n=120)		‘t’ value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Chicks	2.89	0.31	2.92	0.28	0.656	.513
Housing	2.32	0.47	2.16	0.45	2.677	.008
Feeding	2.92	0.28	2.74	0.44	3.688	.000
Medication	2.45	0.50	2.62	0.49	2.614	.010

*Scale values: 1=not adopted, 2=discontinued 3= partially adopted, 4=fully adopted.

Level 7: End Results

SWOT analysis: Tables 12-15 show the top five SWOT issues in CBF and NCBF. No marketing risk (100 percent), doorstep delivery of inputs and EAS (90 percent), low variable costs to the farmers (85 percent), low production cost (81.66 percent) and maximum efficiency in production (66.66 percent) were perceived as five major strengths of CBF. Comparatively higher margins (81.66 percent), easy to change input providers (63.33 percent), quick returns (58.33 percent), efficiency in production (53.33 percent) and all-in-all-out system (41.66) were the five strengths perceived in NCBF (Table 12).

Table 12. Strengths of contract and non-contract broiler farming.

CBF (n=120).			NCBF (n=120).		
Strengths	(Frequency (%))	Rank	Strengths	(Frequency (%))	Rank
No marketing risk	120 (100)	1	Comparatively higher margins	98 (81.66)	1
Inputs and EAS doorstep delivery	108 (90.00)	2	Easy to change input providers	76 (63.33)	2
Low variable costs to the farmers	102 (85.00)	3	Quick returns	70 (58.33)	3
Low production cost	98 (81.66)	4	Efficiency in production	64 (53.33)	4
Efficiency in production	80 (66.66)	5	All-in-all-out system	50 (41.66)	5

Low RCs (91.66 percent), high investment in fixed costs (79.16 percent), low margins (66.66 percent), production cost estimation favoring companies (61.66 percent) and shortage of skilled labor (60 percent) were perceived as major weaknesses of CBF. High marketing risk (93.33 percent), high fixed and variable costs (87.5 percent), no government EAS provision (80 percent), demand fluctuations (76.66 percent) and seasonal inputs availability (74.16 percent) were perceived as major weaknesses in NCBF (Table 13).

Table 13. Weaknesses of contract and non-contract broiler farming.

CBF (n=120).			NCBF (n=120).		
Weaknesses	Frequency (%)	Rank	Weaknesses	Frequency (%)	Rank
Low rearing charges	110 (91.66)	1	High marketing risk	112 (93.33)	1
High investment in fixed costs	95 (79.16)	2	High fixed and variable costs	105 (87.5)	2
Low margins	80 (66.66)	3	No government EAS provision	96 (80.00)	3
Production cost estimation favoring companies	74 (61.66)	4	Demand fluctuations	92 (76.66)	4
Shortage of skilled labor	72 (60.00)	5	Seasonal inputs availability	89 (74.16)	5

Enhancing RCs and sharing rate incentive margins with farmers (90 percent), mentioning input standards in agreements (80 percent), scope for further expansion and value chain development (75 percent), high demand and acceptability for poultry meat (68.33 percent) and wet market to processed marketing for further value chain development (62.5 percent) were the important opportunities perceived in CBF. Assured marketing (93.33 percent), minimum support price above production cost for chicken (85 percent), agriculture status to poultry farming (74.16 percent), efficient forecasting of demand to reduce marketing risk (65.83 percent), and scope for preparing own feed and automation (65 percent) were the major opportunities perceived in NCBF (Table 14).

Table 14. Opportunities in contract and non-contract broiler farming.

CBF (n=120)			NCBF (n=120)		
Opportunities	Frequency (%)	Rank	Opportunities	Frequency (%)	Rank
Enhancing RCs and sharing rate incentive margins with farmers	108 (90.00)	1	Assured marketing	112 (93.33)	1
Input standards to include in agreements	96 (80.00)	2	Minimum support price above production cost	102 (85.00)	2
Scope for further expansion and value chain development	90 (75.00)	3	Agriculture status to poultry farming	89 (74.16)	3
High demand and acceptability for poultry meat	82 (68.33)	4	Efficient forecasting of demand to reduce marketing risk	79 (65.83)	4
Wet market to processed marketing for further value chain development	75 (62.5)	5	Scope for own feed preparation and automation	78 (65.00)	5

Unilateral contracts favoring integrators (63.33 percent), no regulations/specifications on inputs (54.16 percent), monopoly by a few companies (37.5 percent), emerging and reemerging diseases (25 percent), and environmental concerns on poultry farms (20.83 percent) were the major threats perceived in CBF. The other important threat perceived in CBF was poultry welfare issues by 20 percent of respondents. High marketing risk and high production costs leading to withdrawal from NCBF (71.66 percent), volatile markets (65 percent), control of the market by a few contract companies (54.16 percent), spurious inputs (46.66 percent), and emerging and reemerging diseases (28.33 percent) were the major threats perceived in NCBF (Table 15).

Table 15. Threats to contract and non-contact broiler farming.

CBF (n=120)			NCBF (n=120)		
Threats	Frequency (%)	Rank	Threats	Frequency (%)	Rank
Unilateral contracts favoring integrators	76 (63.33)	1	High marketing risk and production costs leading to withdrawal from NCBF	86 (71.66)	1
No specifications on inputs	65 (54.16)	2	Volatile markets	78 (65.00)	2
Monopoly by a few companies	45 (37.5)	3	Control of market by a few companies	65 (54.16)	3
Emerging and reemerging diseases	30 (25.00)	4	Spurious inputs	56 (46.66)	4
Environmental concerns on poultry farms	25 (20.83)	5	Emerging and reemerging diseases	34 (28.33)	5

FGD: Based on FGD with key stakeholders, the selection criteria and terms and conditions applicable to contract farmers are presented (Box 2).

The FGD findings indicated that all privileges and rights were in the hands of the contract companies; requirements on poultry sheds/equipment/utilities etc., were very rigorous; specifications on outputs to be achieved by farmers – FCR, mortality, body weight, SPC., etc. - were fixed by and favored the contract companies; contracts did not mention the specifications on inputs to be delivered by companies - chick weight, quality of feed, medicines and vaccines, qualifications of EAS providers, etc., - all of which directly affect body weight of the adult birds; contracts were not in the local language, and no farmer was given copy of the agreement; no reasons were given for fixing Rs. 4 as RC, stringent production cost incentives and penalties in the agreements, which are in favor of contract companies; with very meager rate incentive norms in case of high market prices, the majority of marketing margins favored the contract companies, and; tax deduction at source is not justifiable when farmers were given only rearing charges.

Box 2: Selection criteria and terms and conditions applicable to contract farmers.

Selection: A farmer who is interested in CBF applies to the company with personal, financial and farm details (ownership, location, local reference, shed(s) and infrastructure - capacity, history, water source, electricity/power back-up, equipment, labor, and previous poultry farming history). The company independently verifies and assesses rigorously the suitability of the farm for CBF. If found suitable, fix the batch size.

Terms and conditions applicable: Standard production cost (SPC)/kg of live chicken is calculated based on flock size, inputs cost (chick, feed, medicines, vaccines, management charges) with clauses viz.,: mortality allowed - 5 percent; standard body weight - 2 kg; FCR - 1.85; RC – Rs. 4/kg of live chicken. Additional RC of Rs. 0.10 per kg to be paid extra for farms with 20,000 chick's placement. Incentive for reduction in cost below SPC and penalty if it exceeds SPC. Market rate incentive to be calculated above Rs. 65 to 70/kg live chicken @ 5 paisa per rupee earned, and from Rs.70.01 upwards, 10 paisa per rupee earned, with a maximum rate incentive limit of Rs. 2 per kg. Farmers who maintain production cost below SPC and a converted FCR of 1.75 or below, in three consecutive batches will be given 10 paisa per kg extra for the three batches. Rs. 25 per ton towards feed unloading charges will be paid to the farmer. Cost of losses above 5 percent mortality will be recovered from the farmer at a rate equivalent to chick cost, inclusive of cost of medicine, vaccine and management. If any shortage of birds is noticed, it will be recovered at actual cost plus Rs. 5 or highest rate sold + Rs. 5, whichever is higher. All payments to the farmer will be made with tax deduction at source as per the government rules. If the cost of production is above SPC, shortages above 2 percent of the chicks supplied or mortality above 15 percent and high FCR for two consecutive batches, the contract of such farm will be terminated. All these terms and conditions are subject to change at the discretion of the company.

The contractor will not come to the rescue of the farmer in case of the mortality of the birds due to natural calamities like cyclones, earth quakes, fire accidents, etc. The contractors also get cheated by some of the farmers who indulge in sale of birds to other parties, adding extra birds with the same feed, sale of feed to other parties, noncompliance to the advices of the EAS provider, etc. There are ample reasons why many contract farmers keep on shifting from one contractor to the other as they always feel they were underpaid for their effort. Lack of trust between the integrator and the farmer is the main reason for this. There are also instances where in many farmers stick to the same contractor for years, which is due to solid trust and satisfaction between both the parties.

Conclusions and Implications for Policy

The study evaluated integrated CBF and NCBF systems in India's Karnataka, Telangana and Andhra Pradesh states. The findings on demographics were comparable except that non-contract farmers had greater experience. Contract farmers had more broiler sheds, produced fewer batches per year, and used more hired labor. In CBF sale rate was lower, while sale weight and weight gain were higher. Among the inputs, the chick cost was lower and labor cost was higher in CBF, whereas bedding material, electricity, EAS and miscellaneous costs were higher in NCBF. In spite of low production cost, the contract farmers were losing a margin of Rs. 5.99 per bird to avoid marketing and production risks. The integrators were the sole source

of free EAS under CBF, while private poultry consultants provide EAS on payment in NCBF. The majority of contract farmers had not changed integrators; the majority of non-contract farmers had changed input provider(s) in the past two years. The perception of contract farmers on inputs, outputs and EAS was significantly higher than that of non-contract farmers. Adoption of technical advice related to housing and feeding was better in CBF and medication was better adopted in NCBF. The internal strengths/weaknesses, and external opportunities/threats that emerged in the study are helpful in matching the resources and capabilities to the competitive environment in which CBF and NCBF systems are operating. The FGD indicated that, all privileges and rights were in the hands of the contract companies.

The overall findings of the study indicated that production cost in CBF was significantly low due to modest input costs, which are provided by contract companies. In spite of that, the total returns in CBF were also significantly low because efficiency surplus is largely taken by contract companies. On the other hand, though production cost was high, farmers in NCBF were gaining a margin of Rs. 5.99 per bird despite facing marketing and production risks. **This leads to the conclusion that contract and non-contract farmers incur significantly different production and marketing costs and earn different marketing margins.** The standard deviations on returns under both the systems confirms that, the net returns in CBF are guaranteed and predetermined, while in case of NCBF it varies widely depending on the market rate and seasonal fluctuations. **This points to the conclusion that CBF do not enable contract farmers to make better profits than independent farmers, rather it gives a lower, but assured and almost fixed, returns.**

Despite low returns, farmers are participating in CBF largely because of their inability to bear the high investments on inputs, assured income, doorstep delivery of quality inputs and EAS freely (i.e., low working capital) and absence of marketing risk. On the other hand, through improved technology, low margins on inputs, economy of scale and stringent norms, the companies are reducing production cost leading to lower retail chicken prices for consumers (Prabakaran, 2003; Landes et al., 2004). **All these factors resulted in successful value chain development through CBF.**

Nevertheless, in the absence of a regulatory body, all privileges and rights were in the hands of contract companies. Though standards on infrastructure and outputs were fixed by contract companies in their favor, the contracts were silent on standards on inputs to be delivered by contract companies. With meager rearing charges, stringent production cost incentives and penalties, the agreements clearly favored the contract companies. **The survey and FGD findings revealed that the value chain development and provision of inputs and EAS by large private poultry companies did not really result in a win-win situation for both integrators and farmers.** Though it is not a win-win situation, farmers still participate in CBF as the returns are assured and fixed and there is no need to bear soaring input costs, as well as high market and production risks. Once entered into contract, most of the farmers cannot get away from the CBF mainly because of their investment in shed and equipment that cannot be put to use for other purposes or occupations.

Recommendations

Although some limitations have been identified, there is huge potential and need for further value chain development through CBF. Keeping this in mind, and to address limitations, the following specific policy interventions are recommended.

Further promotion and regulation of CBF: Factors that are attracting farmers to CBF include

- i) Farmers are free from investment, production and marketing risks
- ii) Doorstep delivery of inputs, which includes chicks, feed, medicines, EAS, technical services, and training;
- iii) Close daily monitoring by contract companies.

Without CBF, the poultry companies engaged in chick, feed, vaccine and medicine production also face risks to their profitability. Therefore, CBF is an institutional arrangement that tackles risks of both farmers and companies through market linkages (Minot, 1986; Sundararajan, 2005; Ramaswami et al., 2006). Findings of the present study and other reports (Glover, 1987; Little and Watts, 1994; Thamizhselvi and Rao, 2009; Thamizhselvi and Rao, 2010), however, revealed that the value chain development and provision of EAS by large private poultry companies is not always a win-win situation for both the parties. Gulati (2008) and Kalamkar (2012) also opined that balanced contracts that benefit both the parties – through assured markets, competitive price and guarantee against risk – result in successful value chain development. Although some limitations have been identified, there is a huge potential and need for regulated expansion and further value chain development through CBF. Based on the findings of this study and other researches, it is recommended to establish a regulatory body to balance the profits of both the integrator and contract farmer and to enforce environmental and welfare issues.

Enhance rearing charges and revise rate incentive norms to transfer part of market margins to the farmers: With a meager rearing charges, stringent production cost estimation, penalties and minimal rate incentive norms in case of high market prices, the agreements favor the contract companies and exploit small farmers. In spite of this exploitation, contract farmers still prefer this system because they perceive that they benefit more, to some extent, by participation than non-participation. The current rearing charge is Rs. 4 and rate incentive norms are at 5 paisa per rupee earned from Rs. 65 to 70/kg live chicken and from Rs.70.01 upwards, 10 paisa per rupee earned, with a maximum rate incentive limit of Rs. 2 per kg. The low rate incentive norms in case of high market prices mean that the contract companies and consumers are benefiting more than farmers when prices of chicken go up. Hence, an upward revision of rearing charges to at least Rs. 6 per kg live chicken is recommended. It is also recommended to revise rate incentive norms to transfer part of market margins to the farmers in case of high market prices.

Increase the number of batches per year by contract farmers: In spite of having more broiler sheds and hiring labor on an annual basis, contract farmers are raising fewer batches per year than non-contract farmers, mainly because the contractors supply not more than five batches of chicks in a year. The contract farmer will not be in a position to use his shed and labor efficiently resulting in significantly higher cost, especially in labor. To utilize labor effectively throughout the year and to get returns on fixed

cost investments, they need to rear at least six batches per year. Hence, it is recommended that contract companies provide chicks for at least six batches per year.

Transparency in executing contract agreements: Agreements mention standards on poultry sheds, equipment and outputs, but are silent on inputs to be delivered by contract companies. In addition to providing input standards, contract agreements are to be prepared in the local language and a copy to be provided to the contract farmers which aid in building trust and confidence among the partners of CBF.

Government support to promote CBF and NCBF: Taking the SWOT issues into consideration, it is recommended that the Government of India take measures to assure marketing, a minimum support price over and above the production cost, according agriculture status to poultry farming (to garner the subsidy benefits on electricity, low interest bank loans and other inputs) and to develop efficient market information to reduce uncertainty in poultry marketing. Recently, Telangana state announced agriculture status to poultry farming. Other states also need to give agriculture status to poultry farming to get the subsidy benefits.

Equitable and inclusive development: Effective EASs, doorstep provision of inputs, technical expertise and market linkages are key factors for the success of CBF/NCBF, which are necessary for modernization and food security. However, the missing elements in both CBF and NCBF systems are equity, farmers' organization and sustainability – which are essential for socially inclusive development. The findings indicated that women are only participating as laborers, but not as the owners in both systems. Also the ownership lies with socially affluent members with exclusion of disadvantaged communities and social class in both the systems. Basic economic resources are required in the form of fixed (for CBF and NCBF) and working capitals (for NCBF) to take up broiler farming, which the marginally poor farmers cannot afford. For those who want an affirmative policy that favors the poor and socially disadvantaged, both the systems studied may not be the answer. This raises the issue if CBF/NCBF would be appropriate for resource-poor and smallholder farmers. Also, the components of farmers' organization and intense competition among integrators/input suppliers are missing in both the systems to protect the interests of farmers from exploitation. The contracts are reasonably loaded in favor of the integrators. Profit and sustainability is their motivation and they should really not be faulted for that as this is part of modernization and private service delivery. However, what is needed is to allow small farmers to ride in the system and not be subjective to injustice and excessive exploitation for an inclusive development. If farmers are more organized, that would give them leverage in dealing with the asymmetric contract with integrators in CBF or to bargain with input suppliers in NCBF. The farmers' organizations also help the contractors in weeding out the unscrupulous farmers or building the group pressure in adopting healthy poultry development practices. This will be complementary to the proposed government regulations.

Replication of EASs in CBF and NCBF: A survey by India's National Sample Survey Organization (NSSO, 2005) showed that only 5.1 percent of the households could access livestock EAS. The corresponding figure for agriculture EAS was 40.5 percent, indicating gross neglect of livestock EAS in the country. Findings of the present study revealed that, with the participation of the private sector, poultry EAS and other input services reached every individual commercial poultry farmer with efficiency and effectiveness. Under CBF, the integrators are the sole source of free EAS as part of agreement. Under NCBF, farmers could get the same

services from private poultry consultants on payment of an EAS charge of Rs. 0.52/kg of live chicken produced. This is an effective and successful model of modernization of EAS and related input delivery as a complete package through private sector. This model needs to be encouraged in other sectors to develop entrepreneurship among farmers by addressing the few limitations discussed above.

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