EVALUATION OF LOW – INPUT INTERVENTIONS FOR IMPROVED PRODUCTIVITY OF INDIGENOUS CHICKENS IN WESTERN KENYA

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Abstract

The experiment evaluated the effects low input interventions on productivity, flock dynamics and bird offtake of indigenous chickens within households. Flocks within households were compared under different interventions: (1) daytime confinement and creep feeding of chicks using a coop or pen (CONF); (2) supplementation for the rest of the flock (SUPP), (3) vaccination against Newcastle disease (VACC) and their combinations. Interventions NCD, CONF, SUPP and their combinations significantly improved chick survival (%), egg production (Egg/h/yr) and weight gain(Wg). Chick survival, eggs/h/yr and Wg improved from 25.4% to between 55.5 – 91.6%; 66 to between 92.8 – 97.8 eggs/h/yr and 8.6 to between 9.3 – 14.6 g/b/d respectively. It was observed VACC had a negative effect in young chicks less than three weeks of age. Interventions improved flock sizes per household, into flock flows and offtake of birds per household. Wastage of birds was high in CONT. Improvements were attributed to reduced disease incidence; protection of young chicks against predators; increased vigour of creep fed chicks; hens too accessed creep feed, protein deficits addressed by supplementation and increased laying time for hens when chicks were hand reared. It suggests NCD as number one killer and a feed (protein) deficit in scavenging chicken production systems.

Key words: Village, chicken, productivity ,interventions.

INTRODUCTION

Local poultry production is an integral part of the farming system in Western Kenya and represents almost the total poultry flock in the region, with each household keeping between 10-20 birds. It also provides a significant part of poultry products in the region. These birds are raised mostly under scavenging free-range systems with minimum resource inputs. The productivity of these chickens and utilization (sales and consumption) of meat within households is generally low compared to that of exotic birds. The average annual egg production ranges from 36 to 97 eggs per hen, with a very small egg size of about 46 g (Okitoi *et al.* 1997).

One of the major reasons for this poor productivity is the lack of appropriate low cost technologies that match the socio-economic conditions of the farmers in the free-range/scavenging system of production Technologies developed for improvement of poultry often are geared towards birds in confinement and large commercial flocks. Improvements in the indigenous chicken production system will initially require low cost options with small additional resources that address the most common problems. The major constraints identified in the village poultry production in western Kenya, were diseases particularly Newcastle disease (NCD), feed deficits and heavy losses of young chicks through predation because birds are only confined at night in the main house or kitchen (Okitoi *et al*. 1997). The study assessed the productivity, flock dynamics and offtake of local birds on introduction of simple low cost technologies of vaccinating village poultry against NCD, supplementary feeding and daytime confinement of chicks.

MATERIALS AND METHODS

Study site

The study was conducted in four selected villages in western Kenya representing different agroecological zones (Butula (LM1) in Busia District; Malava (LM2) in Kakamega District; Uranga (LM3) in Siaya District and Sabatia (UM1) in Vihiga district for. Flocks as experimental units comprised a mixture of hens, cocks, pullets and chicks owned by individual households.

Interventions

Interventions comprised of 1.) Vaccinating village flocks using strain F attenuated virus vaccine (Kevevapi, Kenya) administered by eye or nasal drops twice per year. 2.) Supplementing flocks with protein rich supplements such as fish waste, termites and blood/ruminal contents above scavenging levels. 3.) Daytime confinement of young chicks using coops (*lisera*) or pens and creep feeding them.

Experimental design

The design of the experiment was completely randomized design (CRD). Farmers made individual choices from above intervention and were stratified into 4 experiments: (1) no intervention at all (CONT), n = 22; or (2) a single intervention of vaccination of village birds against Newcastle disease twice a year (VACC), n = 61; or (3) VACC and additionally daytime confinement and creep feeding of young chickens using coops or pens (VACC+CONF), n = 16; or (4) VACC+CONF and additionally supplementary feeding of village birds using locally available feed resources above scavenging levels (VACC+CONF+SUPP), n = 18.

Data collection

Recall data was collected for 24 months. Productivity information included data on chick mortality, weights, egg production hatchability and adult mortality. Flock dynamics information was grouped as: Into flock parameters such as purchases, gifts in and chicks hatched; Bird off take parameters such as sales, consumption and gifts out; Bird wastage parameters such as daily mortality, predation and other causes of deaths

Statistical analysis

Data were subjected to analysis of variance using the general linear model of statistical analysis systems (SAS 1997). Means were tested by Duncan's multiple range test (Steel and torrie 1984)

RESULTS

Results presented in table 1 show that survival rates of chicks to 8 weeks of age, losses of adult chickens per household per week and egg production improved significantly ($P<0.05$) when farmers vaccinated their village flocks against Newcastle disease (NCD), combined vaccination with confinement of chicks during the day in coops (*lisera*) or in pens (VACC + CONF) and incorporated supplementation (VACC +CONF + SUPP). However, there was an observed decline in survival rates of chicks vaccinated at ages less than 3 weeks. The controls (CONT) and vaccinated (VACC) only flocks were not significantly different in weight gains. Inclusion of confinement (VACC + CONF) and supplementation (VACC +CONF + SUPP) resulted in significantly higher weight gains.

The best results of village chickens in terms of growth rates, survival rates, and egg production were attained when farmers vaccinated their flocks against NCD twice a year, confined chicks during the day and supplemented their flocks with protein supplements above scavenging levels (VACC+CONF+SUPP)

Results of table 2 indicate there was no significant difference ($p>0.05$) in average standing flock per household and weekly inflow of birds per household between controls (CONT) and those who vaccinated only (VACC). However, there was a significantly ($p<0.05$) higher weekly wastage of birds per household and lower weekly offtake of birds per household in controls (CONT). Adopting the three interventions (VACC+CONF+SUPP) resulted in significantly ($p<0.05$) higher average standing flock sizes per household, weekly inflow of birds into households, weekly wastage of birds per household and weekly offtake of birds per household.

Table 2 shows a simple regression of the wastage of chicken on the weekly offtake of the birds. The simple regression curves showed a good fit of R = 0.71,0.70 and 0.78 for diseases, predation and other causes of wastage respectively. From this equation, a 1% reduction of losses of birds through disease control increased offtake rate by 0.11% whereas a 1% reduction of losses of birds through prevention of predation increased offtake by 0.08%. Control of other causes of bird wastage by 1% increased offtake by 0.06%.

DISCUSSION

The improvement in survival rates and egg production of village flocks vaccinated against NCD can be attributed to improved health and reduced stress due to disease in vaccinated village flocks. It also , Suggests that NCD is the number 1 problem in village flocks. Recent reports (Demey 1998) indicating annual outbreaks of NCD to killing 70-80% of unvaccinated flocks in developing countries supports this. The decline in survival rates of chicks less than 3 weeks can be attributed to high maternal antibody titres in young chicks less than four weeks of age (Bell 1990 and Ratanasethatul 1988) The high levels of maternal antibody titres in village chicks appeared to neutralize the effects of live vaccines, thus chicks appeared not reactive to the vaccine.

Further improvement in egg production and survival rates upon combining NCD vaccination and daytime confinement of chicks (NCD+CONF) can be attributed to increased laying time available to the hen since chicks are hand reared after hatching and improved nutrition since confined chicks received special supplementation since they have to be fed and in the event of creep feeding chicks adult hens also accessed the residue of creep feed. Also confined chicks were free from predation and harsh weathers, Robertts et al 1994, Chandrasiri et al 1994 and Pratseyo et al 1985 support this. The best results of village chickens in terms of growth rates, survival rates, and egg production were attained when farmers vaccinated their flocks against NCD twice a year, confined chicks during the day and supplemented their flocks with protein supplements above scavenging levels (VACC+CONF+SUPP) can be attributed to reduced disease incidence and predation due to vaccination and confinement and improved nutritional status through supplementation. Improving the nutritional status of village flocks by creep feeding chicks reduced disease incidence and predation because usually chicks were lost while they wondered with mother hens scavenging for feed. Well fed chicks had the vigour to thrive in scavenging situations (Roberts et al 1994; Chandrasiri et al 1994). Confining them gave protection against predators and harsh weather. The positive response to protein supplementation of village chickens suggested that the village feed resource base was limiting egg production in a traditional free-range system. Village flocks fed mostly on kitchen waste, weeds, grasses, grains, worms and insects picked from around the homestead. During harvest times, they received plenty and little thereafter mainly due to competition with humans (Okitoi et al.1997).

The significant increase in standing flock sizes per household when farmers adopted the three interventions (VACC+CONF+SUPP) was due to an increase in weekly inflow of birds mainly due to increases in hatching and purchases of hens. It suggested that families were seeking to produce more meat by rearing more chicks and purchasing more hens. Sales and consumption of birds increased on adoption of simple technologies. There were more sales than consumption within households suggesting that farmers kept local chickens first for income and then consumption. As flock sizes increased farmers tended to move from subsistence type of production to a more commercial one.

The regression equation translated into saying a reduction in losses of 9.1 birds due to vaccination against NCD increased bird availability (for sale, consumption or gifts out) by one bird. Whereas a reduction in losses that were due to predation and other causes of wastage by 12.5 and 14.2 birds, respectively, increased offtake by 1 bird in each case.

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Tab. 1.: Productivity of flocks under three low-input interventions

	Chick survival(%) to 8 weeks	Adult losses/wk	Eggs/h/yr	Growth rate (g/b/d)
CONT	25.4c	1.22a	66b	8.6b
VACC	55.5b	0.96b	97.9a	9.3b
VACC +CONF	87.5a	0.59b	92.8a	12.8a
VACC +CONF +SUPP	91.6a	0.3c	94.4a	14.6a
S.E.M	16.1	0.48	29.3	4.15

S.E.M Standard error of mean

-a,b,c- Values with different superscripts in the same column are significantly different ($p<0.05$)

Tab. 2.: Dynamics and offtake of flocks under three low-input interventions

	Flock size per household	Inflows of birds in numbers/hh/wk	Wastage of birds in numbers/hh/wk	Offtake of birds in numbers/hh/week
CONT	14.6c	1.54b	1.2a	0.4b
VACC	14.7c	1.56b	0.96b	0.6a
VACC +CONF	20.0b	1.85b	1.03b	0.6a
VACC +CONF +SUPP	27.2a	2.47a	1.43a	0.7a
S.E.M	8.1	0.32	0.16	0.02

S.E.M Standard error of mean

-a,b,c- Values with different superscripts in the same column are significantly different ($p<0.05$)

Tab. 3.: Regression co-efficient for the dependent variable offtake in indigenous chicken.

	B	Standard Error	R^2
(Constant)	0.15	0.01	
Disease	-0.11	0.01	0.71
Predation	-0.08	0.01	0.70
Others out	-0.06	0.01	0.72