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# IMPACT OF HERBAL BASED DIETS ON PRODUCTION EFFICIENCY OF BROILER

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## ABSTRACT

The experiment was conducted with the aim to find out the effect of Indigenous herbal drug and market herbal drug (*Livkey*) on the performance efficiency of broiler chicks. Ninty nine broiler chicks (VenCobb - 400 strains) were selected with all the birds bearing almost similar body weight were randomly divided into three group's first one as a control ($T_1$) and second and third were $T_2$ and $T_3$ as a treated group respectively. Each group having 33 broiler chicks with three replications (11 birds in each) were reared under deep litter system. Both the groups offered broiler starter (2-28days) and finisher (29-42days) diet except variation in supplementation of with 50mL market herbal drug (*Livkey*) per kg feed and Indigenous herbal drug (W:A:M in the ratio of 50:25:25 respectively) @ 2%/kg diet in $T_2$ and $T_3$ treated groups respectively. The results showed a significant difference in terms of body weight gain, feed consumption, feed conversion ratio (FCR), performance efficiency and dressing percentage in $T_3$ group as compared to $T_2$ group followed by $T_1$ group. During the trial the mortality percentage were found to be minimum in $T_3$ and $T_2$ group followed by $T_1$ group.

**Abbrevation**: W: *Withania somnifera*, a: *Asparagus racemosus* and M: *Mucuna pruriens*.

## INTRODUCTION

India's rapidly growing poultry industry also offers investment opportunities for foreign players in activities such as breeding, animal health, feed, equipment and processing. Foreign investment in these activities is permitted but constrained by market uncertainty and poor infrastructure. Within the poultry sector, broiler production is growing much faster than egg production. Feed is a major component, affecting net return from the poultry because cost of the feed accounts about 65 to 70% for broiler production and is a major factor which affects the production cost. To ensure more net return and to minimize high expenditure on feed; are the main challenges for which adding some of the growth stimulators as an herbal drug in poultry diets. Herbal feed additives as growth promoters in broiler diet and found better response in terms of performance efficiency of broiler chicks (Abaza *et al.*, 2003; Hosamani *et al.*, 2004; Rao, 2005; Kumar *et al.*, 2006; Khosravi *et al.*, 2008; Sisodhiya *et al.*, 2008; Manwar and Mandal, 2009; Singh, 2009; Ul haq *et al.*, 2011). Further, used of Ashwagandha, Satavari, Kapi-Kachchu and *Livkey* as feed additives to enhance the growth rate of broiler chicks (Singh *et al.*, 2008; Ram Niwas *et al.*, 2011; Srivastava *et al.*, 2012). With this background, during the present investigation a self compounded herbal drug containing Ashvagandha (*Withania somnifera*), Satavari (*Asparagus racemosus*) and Kapi-Kachchu (*Mucuna pruriens*) were added in broiler ration and to find out the production efficiency of broiler chicks.

## MATERIALS AND METHODS

The trials were conducted at the Poultry farm of Agriculture Farm, Institute of Agriculture Sciences, Banaras Hindu University, Varanasi – 221005 (India). Ninty nine, one day old (VenCobb-400) broiler chicks were randomly divided into three groups having almost similar body weight (33 birds in each group) with three replication of 11 birds in each. The birds were kept under deep litter system. Compositions of broiler ration and market herbal drug (*Livkey*) presented in Table 1 and 2 respectively. At the start of the experiment the broiler starter ration was fed to the control group ($T_1$) from 2 day to 28 days containing 22% CP (Crude Protein) and 2900 Kcal (metabolizable energy)/Kg diet and the same ration was mixed with 50mL market herbal drug (*Livkey*) per kg feed and Indigenous herbal drug *(W: A: M i.e. 50:25:25)* @ 2% per kg diet fed to the $T_2$ and $T_3$ treated groups respectively. Further broiler finisher ration containing 20% CP (Crude Protein) and 3000 Kcal (ME)/ Kg diet was given to control group ($T_1$) from 29 to 42 days of age while treatment groups fed the same finisher diet containing 50mL market herbal drug (*Livkey*) per kg feed and indigenous herbal drug *(W: A: M)* @ 2% per kg of diet fed to the $T_2$ and $T_3$ treated groups respectively. Daily weighed amount of fresh feed was distributed in the feeder of each group and the feed residue left in the feeder was collected. To find out the consumed feed by each group of the chicks the feed residue was deducted from the amount of feed offered to each group. Similarly, the body weight gain (g) of each group was recorded at every week of interval to get the growth performance with the help of "Monopan Balance". Likewise, cumulative feed conversion efficiency (kg of feed for every kg body weight gain) of broiler chicks of all groups at the end of each week were calculated as the ratio between cumulative feed consumption and live weight attained upto that week.

Further the performance efficiency was calculated as the ratio of body weight (kg) and feed conversion efficiency, multiplied with 100. The mortality of birds was recorded as and when it occurred. Towards the end of trial five birds from each group were randomly selected and slaughtered by "Modified Kosher" method for the dressing percentage (Korczak and Grabowicz, 2003). Finally, the data analyzed by SAS programme (SAS, 2004) using general linear model (GLM) significant differences among treatment means are separated using least significant difference (LSD) method.

## RESULTS AND DISCUSSION

### Physical parameters

### Cumulative body weight gain

The average body weight from zero to sixth week of age was 0.042, 0.130, 0.380, 0.750, 1.280, 1.710 and 2.200kg in $T_1$; 0.042, 0.140, 0.420, 0.800, 1.360, 1.800 and 2.240 kg in $T_2$ and 0.042, 0.150, 0.460, 0. 850, 1.420, 1.890 and 2.340 kg in $T_3$ groups respectively. The average body weight gain of chicks in $T_1$, $T_2$ and $T_3$ groups was 0.042 kg in all group at zero week of age; 0.130, 0.140 and 0.150 kg in the first week; 0.380, 0.420 and 0.460 kg in the second week; 0.750, 0.800 and 0.850 kg in the third week; 1.280, 1.360 and 1.420 kg in the fourth week; 1.710, 1.800 and 1.890 kg in the fifth week and 2.200, 2.240 and 2.340 kg in sixth week respectively (Table 3). In first week all the chicks were fed with their respective feed and showed difference in cumulative body weight from the end of first week upto sixth week of the age. At the end of trail the body weight was 2.200, 2.240 and 2.340 kg in $T_1$, $T_2$ and $T_3$ groups respectively. Statistically there was a significant ($P < 0.05$) difference in body weight of all the groups in rainy season (Table 3). Average cumulative body weight gain of three groups from first to sixth week of age followed same trend *i.e.* increasing trend and in the sixth week. The average cumulative body weight was maximum (2.200, 2.240 and 2.340 kg in $T_1$, $T_2$ and $T_3$ groups respectively). The cumulative body weight gain obtained in this study is in agreement with the reports of Abaza *et al*. (2003), Devajani *et al*. (2004), Rekhate *et al*. (2004), Rao (2005) and Kumar *et al*. (2006). A similar result was reported by Ram Niwas *et al*. (2011) and Srivastava *et al*. (2012) regarding the weekly body weight gain in broilers.

### Cumulative feed consumption

The cumulative feed consumption during rainy season was calculated at the end of each week. The average cumulative feed consumption in terms of kg. / bird in $T_1$, $T_2$ and $T_3$ groups was 0.240, 0.230 and 0.220 kg at the end of first week; 0.630, 0.610 and 0.590 kg at the end of second week; 1.180, 1.160 and 1.120 kg at the end of the third week; 1.970, 1.930 and 1.890 kg at the end of fourth week; 2.750, 2.700 and 2.660 kg at the end of fifth week and 3.820, 3.770 and 3.720 kg at the end of sixth week of experimental period respectively. The average cumulative feed consumption from first to sixth of week of age was 0.240, 0.630, 1.180, 1.970, 2.750 and 3.820kg in $T_1$; 0.230, 0.610, 1.160, 1.930, 2.700 and 3.770 kg in $T_2$ and 0.220, 0.590, 1.120, 1.890, 2.660 and 3.7200 kg in $T_3$ groups respectively (Table 3). The cumulative feed consumption in $T_1$ at the end of experiment was greater than $T_2$ followed by $T_3$ groups respectively. To find out the effect of Indigenous herbal drug on cumulative feed consumption, various type of variance were analyzed through factorial Complete randomized Design and there was significant difference ($P < 0.05$) between different groups. The cumulative feed consumption obtained in this study is in agreement with the reports of Obun and Abia (2004). Similar, result was reported by Ram Niwas *et al*. (2011) and Srivastava *et al*. (2012). However, Adejumo *et al*. (2006) and Wekhe *et al*. (2007) found no significant effect on cumulative feed consumption.

### Cumulative feed conversion efficiency

Average cumulative feed conversion efficiency of broiler chicks in $T_1$, $T_2$ and $T_3$ groups was 1.85, 1.58 and 1.42in first week; 1.65, 1.47 and 1.31 at end of second week; 1.59, 1.44 and 1.33 at end of third week; 1.54, 1.42 and 1.33 at end of fourth week; 1.61, 1.50 and 1.41 at end of fifth week and 1.78, 1.69 and 1.59 at the end of sixth week respectively. The best feed conversion efficiency was found in group $T_3$. Average cumulative feed conversion efficiency by the birds at the end of each week from first to sixth week was 1.85, 1.65, 1.59, 1.54, 1.61 and 1.78 in group $T_1$; 1.58, 1.47, 1.44, 1.42, 1.5 and 1.69 in group $T_2$ and 1.42, 1.31, 1.33, 1.33, 1.41 and 1.59 in group $T_3$ respectively (Table 3). The result showed that the cumulative feed conversion efficiency in group $T_3$ at the end of experiment was greater than group $T_2$ followed by group $T_1$. To find out the effect of Indigenous herbal drug on cumulative feed conversion efficiency, various type of variance were analyzed through factorial randomized Design and there was significant difference ($P < 0.05$) between different groups of broilers. The cumulative feed conversion efficiency obtained in this study is in agreement with the reports of Jadhav *et al*. (2008); Sisodhiya *et al*. (2008); Manwar and Mandal (2009) and Singh (2009). Similar, result was reported by Ram Niwas *et al*. (2011) and Srivastava *et al*. (2012).

### Cumulative performance efficiency

The cumulative performance efficiency factor in $T_1$, $T_2$ and $T_3$

**Table 1: Composition of broiler ration**

| S.No | Specification | Percentage Broiler starter | Broiler finisher |
|---|---|---|---|
| 1. | Crude protein | 23.0 | 20.0 |
| 2. | Crude fiber | 5.0 | 5.0 |
| 3. | Calcium | 1.0 | 1.0 |
| 4. | Phosphorus | 0.5 | 0.5 |
| 5. | Lysine | 1.22 | 1.06 |
| 6. | Methionine | 0.83 | 0.72 |
| 7. | M.E. | 2900 kcal/kg | 3000kcal/kg |

**Table 2: Composition of market herbal drug (*Livkey*)**

| S.No. | Specification | Quantity (mg/100mL) |
|---|---|---|
| 1. | Vitamin B1 | 5 |
| 2. | Vitamin B 2 | 5 |
| 3. | Vitamin B6 | 2.5 |
| 4. | *Phylenthus niruri* | 700 |
| 5. | *Andrographis paniculata* | 700 |
| 6. | *Picrorhiza kurroa* | 600 |
| 7. | *Tephrosia purpuria* | 500 |
| 8. | Ferres Sulphate | 200 |
| 9. | L-Lysin | 250 |

**Table 3: Cumulative body weight gain (kg/bird), cumulative feed consumption (kg/bird), cumulative feed conversion efficiency and cumulative performance efficiency of broilers from 1 to 6 week of age as influenced by dietary inclusion of indigenous and marketed herbal drugs in Rainy season**

| Cumulative body weight | Control Group (T1) kg/ bird | Treated Group (T2) kg/ bird | Treated Group (T3) kg/ bird |
|---|---|---|---|
| I week | 0.13 | 0.14 | 0.15 |
| II week | 0.38 | 0.42 | 0.46 |
| III week | 0.75 | 0.8 | 0.85 |
| IV week | 1.28 | 1.36 | 1.42 |
| V week | 1.71 | 1.8 | 1.89 |
| VI week | 2.2 | 2.24 | 2.34 |
| Cumulative feed consumption | Control Group (T1) kg/ bird | Treated Group (T2) kg/ bird | Treated Group (T3) kg/ bird |
| I week | 0.24 | 0.23 | 0.22 |
| II week | 0.63 | 0.61 | 0.59 |
| III week | 1.18 | 1.16 | 1.12 |
| IV week | 1.97 | 1.93 | 1.89 |
| V week | 2.75 | 2.7 | 2.66 |
| VI week | 3.82 | 3.77 | 3.72 |
| Cumulative feed conversion efficiency | Control Group (T1) kg feed/ kg b. wt | Treated Group (T2) kg feed/ kg b. wt | Treated Group (T3) kg feed/ kg b. wt |
| I week | 1.85 | 1.58 | 1.42 |
| II week | 1.65 | 1.47 | 1.31 |
| III week | 1.59 | 1.44 | 1.33 |
| IV week | 1.54 | 1.42 | 1.33 |
| V week | 1.61 | 1.50 | 1.41 |
| VI week | 1.78 | 1.69 | 1.59 |
| Cumulative performance efficiency | Control Group (T1) | Treated Group (T2) | Treated Group (T3) |
| I week | 6.89 | 9.12 | 10.83 |
| II week | 23.16 | 28.30 | 34.85 |
| III week | 47.07 | 55.41 | 63.98 |
| IV week | 83.16 | 95.1 | 107.34 |
| V week | 106.12 | 119.84 | 133.73 |
| VI week | 120.26 | 132.65 | 147.40 |

**Table 4: Effect of *indigenous herbal drug (W:A:M)* and market herbal drug (*Livkey*) with basic diets on dressing percentage (kg) of different groups of broiler in rainy season.**

| Variable | Groups T1 | T2 | T3 |
|---|---|---|---|
| Live weight (kg) | 2.14 | 2.24 | 2.34 |
| Dressed weight (kg) | 1.659 | 1.770 | 1.872 |
| Eviscerated weight (kg) | 1.475 | 1.569 | 1.637 |
| Gizzard weight(kg) | 0.041 | 0.048 | 0.056 |
| Liver weight (kg) | 0.064 | 0.071 | 0.080 |
| Heart weight (kg) | 0.023 | 0.030 | 0.033 |
| Spleen weight (kg) | 0.006 | 0.007 | 0.007 |
| Dressing percentage (%) | 77.50 | 79.00 | 80.00 |

groups was 6.89, 9.12 and 10.83 in first week; 23.16, 28.30 and 34.85 at end of second week; 47.07, 55.41 and 63.98 at end of third week; 83.16, 95.10 and 107.34 at end of fourth week; 106.12, 119.84 and 133.73 at end of fifth week and 120.26, 132.65 and 147.40 at the end of sixth week respectively. The best performance efficiency factor was found in group $T_3$. The average performance efficiency factor at the end of each week from first to sixth week was 6.89, 23.16, 47.07, 83.16, 106.12 and 120.26 in group $T_1$; 9.12, 28.30, 55.41, 95.10, 119.84 and 132.65 in group $T_2$ and 10.83, 34.85, 63.98, 107.34, 133.73 and 147.40 in group $T_3$ respectively (Table 3). The average cumulative performance efficiency factor of three groups from first to sixth week of age followed same trend *i.e.* increasing trend and in the sixth week the average cumulative performance efficiency factor was maximum (120.26, 132.65 and 147.40 in $T_1$, $T_2$ and $T_3$ groups respectively). Cumulative performance efficiency factor in group $T_3$ was significantly higher than group $T_2$ and group $T_1$ in rainy season. The cumulative performance efficiency factor this study is in agreement with the reports of Mishra *et al.* (2000), Sharma *et al.* (2001), Sarag *et al.* (2001), Sinurat *et al.* (2002), Hassan *et al.* (2003). Similar, result was reported by Ram Niwas *et al.* (2011) and Srivastava *et al.* (2012).

### Dressing percentage

The live weight of $T_1$, $T_2$ and $T_3$ groups was 2.14kg, 2.24 kg and 2.34 kg respectively. Similarly, the dressed weight of the broiler in $T_1$, $T_2$ and $T_3$ groups was 1.659 kg, 1.770 kg and 1.872 kg respectively. Similarly, the dressing percentage in rainy season of treatment group (T3) 80%, higher than the treatment group (T2) 79% and followed by control group (T1) 77.5% (Table 4). The above figure shows that the dressing percentage in $T_3$ group was more than the $T_2$ group followed by $T_1$ group. This shows that the indigenous herbal drug (W: A: M) found significant in rainy season. The dressing percentage from this study is in agreement with the reports of Korczak *et al.* (2003), Halder and Roy (2007) and Sultan Mahmood *et al.* (2009).

### Mortality

To study the impact of indigenous herbal drug *(W: A: M)* on diseases resistance quality and mortality of chicks, number of

birds died during the experimental period was noted, the mortality in different treatments group due to accident. In group $T_2$ and $T_3$ minimum mortality was found. In terms of percentage the mean mortality percentage was 6.06 % in group $T_1$; 3.03 % in group $T_2$ and 3.03 % in group $T_3$. By observing the above findings it is clear that feeding of *Livkey* ($T_2$) and *indigenous herbal drug (W: A: M)* ($T_3$) in the broiler mash have not only improves body weight gain but also provide resistance against disease in broiler chicks which is beneficial in terms of net profit. This result is in agreement the cumulative mortality this study is in agreement with the reports of Ansari *et al*. (2008); Ul haq *et al*. (2011). Similarly, the result was reported by Ram Niwas *et al*. (2011) and Srivastava *et al*. (2012). Due to inclusion of different herbs the therapeutic effects on some avian viral diseases which can decrease mortality rate and improve production performance.

## CONCLUSION

Indigenous herbal drug (*Withania somnifera*, *Asparagus racemosus, Mucuna pruriens*) as a feed additive in broiler ration does substantially improve body weight gain, feed consumption, feed conversion ratio (FCR), performance efficiency and dressing percentage. Its have leaving reasonable wide margin for profitability in the enterprise. This is due better functionality of the vital organs.

## REFERENCES

**Abaza, I. M. K., Asar, M. A., Elshaarrawi, G. E. and Hassan, M. F. 2003.** Effect of using Nigella seeds, Chamomile flowers, Thyme flowers and Harmala seeds as feed additives on performance of broiler. *Egyptian J. Agricultural Research*. **81(2):** 735-750.

**Adejumo, D. O. and Williams, A. O. 2006.** Effects of partial replacement of soyabean meal or groundnut cake with sunflower seed meal in broiler chicken diets on performance and plasma metabolites. *Global J. Pure and Applied Sciences*. **12(2):** 159-164.

**Ansari, J. Z., Ahsan-ul-Haq, M. Y., Tanveer, A. and Khan, S. 2008.** Evaluation of different medicinal plants as growth promoters for broiler chicks. *Sarhad J. Agriculture*. **24(2):** 323-329.

**Devajani-deka, Sharma, D. K. and Dutta, G. N. 2004.** Assessment of immunmodulatory effect of stresroak and livamiosole on the maternal immunity against infectious bursal disease by indirect ELISA. *Indian J. Poultry*. **39:** 301-303.

**Halder, G. and Roy, B. 2007.** Effect of herbal or synthetic methionine on performance, cost benefit ratio, meat and feather quality of broiler chicken. *International J. Agricultural Research*. **2:** 987-996.

**Hassan, I. I., Khashaba, B. M. and El-Hindawy, M. M. 2003.** Effect of methionine and some feed additive supplementations on the performance of broiler chicks. *Egyptian Poultry Sci. J.* **23(3):** 485-505.

**Hosamani, S. V., Shivakumar, M. C., Kulkarni, V. S. and Patil, N. A. 2004**. Influence of feed additives on performance of broilers. *Karnataka J. Agricultural Sciences*. **17(4):** 791-793.

**Inam-Ul Haq, Talat, N., Pasha and Anjum, K. 2011.** Comparative efficacy of herbal and allopathy drugs against coccidiosis in poultry. *Italian J. Animal Science*. **10(3):** 201-207.

**Jadhav, N., Maini, S. and Ravikanth, K. 2009.** Comparative efficacy studies of herbal and synthetic Choline supplements on broiler growth and performance. *The Internet J. Veterinary Medicine*. **5(2):** 371-378.

**Khosravi, A., Boldaji, F., Dastar, B. and Hasani, S. 2008.** The use of some feed additives as growth promoter in broilers nutrition. *International J. Poultry Science*. **7(11):** 1095-1099.

**Korczak, I. and Grabowicz, M. 2003.** Effect of herbal additions on productivity and selected indices of slaughter analysis and blood serum in broiler chickens. *Ann. Anim. Sci.* **3:** 189-192.

**Kumar, P., Tiwary, B. K., Singh, S. K., Pallav, S. and Shee, N. C. 2006.** Effect of an adaptogenic herbal preparation on humoral immune response and on some economic traits in broiler chicks. *J. Research, Birsa Agricultural University*. **18(2):** 295-300.

**Manwar, S. J. and Mandal, A. B. 2009.** Effect of reconstitution of sorghum with or without enzymes on production performance and immunocompetence in broiler chicken. *J. the Science of Food and Agriculture*. **89(6):** 998-1005.

**Mishra, L. C. 2000.** Scientific basis for the therapeutic use of ashwagandha (*Withania somnifera*): A review. *Altern. Med. Rev*. **5(4):** 334-346.

**Obun, C. O. and Abia, E. E. 2004.** Performance and haematological changes in starter broiler chicks fed agro-chemical treated maize. *J. Sustainable Agriculture and the Environment*. **6(1):** 77-82.

**Ram Niwas, Srivastava, S. B., Singh, D. P. and Rai, D. C. 2011.** *Livkey* (Herbal drug) vis-à-vis broiler production. *Environment and Ecology*. **29(4A):** 2128-2131.

**Rao, V. 2005.** Efficacy of Herbiotic FS, an herbal anti-microbial growth promoter on performance of broiler birds. *Livestock International*. **9(1):** 11-13.

**Rekhate, D. H., Ukeys and Dhok, A. C. 2004.** Performance and hemobiochemical profile of broilers feed on supplementation of satavari (*Asparagus racemosus*) root powder. *Indian J. Poultry Science*. **39:** 182-184.

**Sarag, A. N., Khobragade, R. S., Rekhate, D. H. and Dhok, A. P. 2001.** Effect of feed supplementation of medicinal plants *Tinospora cordifolia* and *Leptadenia reticulate* on performance of broilers. *PKV Research J.* **25(2):** 114-115.

**SAS 2004.** User's guide: Statistics, SAS Inst., Inc., Cary, Nc.

**Sharma, M., Sapcota, D. and Dutta, K. K. 2001.** Effect of dietary supplementation of herbal products on the performance of broiler. *Indian J. Poultry Science*. **36(2):** 235-236**.**

**Singh, D. P., Rai, D. C., Sinha, S. C. and Singh, S. K. 2008.** Use of asvagandha **(***Withinia Somnifera***)** as a feed additives for layers. *Environment and Ecology*. **26(4c):** 2332-2334**.**

**Singh, N., Bagherwal, R. K., Singh, J. P. and Singh, M. K. S. 2009.** Feed consumption supplemented with herbal formulated during different seasons in Broiler chicks. *Vets Communications*. **4:** 35-37.

**Sinurat, A. P., Purwadaria, T., Togatorop, M. H., Pasaribu, T., Bintang, I. A. K., Sitompul, S. and Rosida, J. 2002.** Responses of broilers to *Aloe vera* bioactives as feed additive: the effect of different forms and levels of bioactives on performances of broilers. *J. Ilmu Ternak dan Veteriner***. 7(2):** 69-75.

**Sisodhiya, J. M., Chcoade, S. S., Rajput, A. B., Chandan Khade, J. M., Ingle, K. S. and Kolte, D. R. 2008.** Compartative study of ashwagandha and commercial synthetic compound on performance of broilers during hot weather. *Vet. World*. **1(10):** 310-311.

**Srivastava, S. B., Singh, D. P., Ram Niwas and Paswan, V. K. 2012.** Effect of herbal drugs as a feed additive in broiler ration. *The Bioscan*. **7(2):** 267-269.

**Sultan, M., Muhammad Mushtaq-Ul-Hassan., Misbah, A. and Fawwad, A. 2009.** Comparative efficacy of *Nigella sativa* and *Allium sativum* as growth promoters in broilers. *Int. J. Agril. Biol*. **11:** 775-778.

**Wekhe, S. N., Ogbamgba, K. O. and Oboh, C. C. 2007.** Preliminary investigation of the effect of *Rhizophora racemosa* (mangrove) feed additive on broiler performance. *African J. Biotech*. **6(1):**1963-1965.