RESULTS

A. Biochemical components of Ascaridia galli:

Total carbohydrate:

The total carbohydrate content of A. galli is 1272.85 - 1372.73 μg/100 mg wet weight and 2429.30 - 3225.22 μg/100 mg dry weight averaging 12.77% and 11.48% in terms of wet and dry weights (Table - I). After the in vitro treatment of a nematicide, the total carbohydrate content markedly decreases. This declining trend is further accentuated during different post treatment (pt.) hours (Table - I). Maximum decrease is noted at 72 hours pt. which is about 4% and 7.93% in respect of wet and dry weights respectively.

Trehalose:

The trehalose content of A. galli showed very interesting results because trehalose, a peculiar disaccharide, which is present mainly in the arthropods is also present in minute quantities in this nematode. Trehalose content in 6.36 - 34.57 μg/100 mg wet weight while 14.59 - 80.99 μg/100 mg dry tissue weight representing the 0.16% of the other components regarding wet and dry tissue weight basis (Table - II). The treatment of nematicide results in the rapid increase of the trehalose content (Table - II). Maximum increase of
the trehalose concentration is recorded at 72 hours post-treatment which is about 1.14% and 1.03% respectively in terms of wet and dry weights (Table - II).

**Glycogen:**

Present experimental results show that 407.31 μg - 582.36 μg of glycogen in 100 mg of wet weight representing an average 4.78% of wet weight of the nematode (Table - III); but when the glycogen is expressed per dry tissue weight it shows 509.88 - 759.31 μg/100 mg dry weight which is 2.78% in average of the other components measured (Table - III). Nematicide treated worms indicates a declination of the glycogen content which is maximum after 72 hours post-treatment and is recorded as 278.98 - 372.03 μg/100 mg wet weight (3.77%)* and (4.54%) (Table - III).

**Total protein:**

*A. galli* shows 2102.38 - 2248.00 μg of protein /100 mg wet weight and 4204.76 - 5829.59 μg total protein/100 mg dry weight which are about 21.42% and 20.36% on an average (Table - IV). The total protein concentration in *A. galli* does not indicate any variation after the removal from the host's system. The nematicide treatment of *A. galli* causes

* Data in parentheses indicates average weight
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a rapid declination of the total protein content (Table IV). After 72 hrs. pt. the protein content decreases to 1900.32 μg/100 mg wet weight and 2978.65 μg/100 mg dry weight (Table-IV).

Free amino acid:
The total free amino acid content of *A. galli* is 674.00 - 798.99 μg/100 mg wet weight and 1859.25 - 2059.12 μg/100 mg dry weight which are about 7.42% and 8.33% on an average (Table - V). Nematicide treatment in the *in vitro* condition induces an increase of total free amino acid in *A. galli*, viz. after 72 hrs pt. the free amino acid content increases upto 958.82 μg/100 mg (10.85%) wet weight and 2855.60 μg/100 mg (15.77%) dry weight (Table V).

Total Lipids:
The total lipid constitutes a major percentage of the nematodes' body. Table VI shows that 620.14 - 872.49 μg of total lipid present in 100 mg of wet tissue constituting 7.50% on an average of the other components but when represents in dry wet basis it shows only 4.99% of an average of the other components (Table - VI). Total lipid decreases markedly after nematicide treatment and it shows the maximum effect after 72 hrs pt. when it decreases upto 680.28 μg/100 mg wet weight (Table - VI). But the average
declination is apparent in Table VI when it indicates that after nematicide treatment the total lipid constitutes 8.82% and 7.62% in terms of wet and dry weight respectively.

**Phospholipid:**

The phospholipid is also present in *A. galli* in a detectable amount. In the *in vitro* analysis it indicates that 66.43 - 158.54 µg/100 mg wet weight phospholipid present which is about 1.03% on an average of the other components measured in this experiment (Table VII). But when this phospholipid content is expressed in terms of dry weight it shows a somewhat different result, i.e. 116.04 µg phospholipid/100 mg or 0.48% dry weight. Treatment of the nematicide causes a rapid declination of the phospholipid concentration in *A. galli*, e.g. after 72 hrs. pt. the phospholipid content recorded as 46.28 µg/100 mg wet tissue (0.62%) and 95.00 µg/100 mg of dry weight (0.57%) (Table VII). Average quantity of phospholipid is 1.03% and 0.77% in terms of wet and dry weights after nematicide treatment.

**Free Fatty Acid (FFA):**

The amount of free fatty acid (FFA) present in *A. galli* is 127.50 - 152.38 µg/100 mg wet weight and 421.21 - 742.52 µg/100 mg dry weight which are on an average (1.38%) and
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(2.54%) respectively. A rapid increase of FFA concentration is noted after nematicide treatment and the value becomes 198.00 - 265.35 µg/100 mg (2.80%) wet weight and 800.86 - 842.99 µg/100 mg (4.53%) dry weight (Table VIII).

Cholesterol:

The concentration of cholesterol in A. galli indicates marked variation after removal of them from the host's body. After 24 hrs. of in vitro treatment cholesterol content amounts 334.71 µg/100 mg wet weight which is about 2.97% on an average and 788.52 µg/100 mg dry weight which is about 2.73% on an average (Table IX). After 72 hrs of in vitro treatment the cholesterol content decreases markedly and shows about 271.95 µg/100 mg (2.69%) wet weight and 523.59 µg/100 mg (2.23%) dry weight (Table IX). Treatment of piperazine hexahydrate causes the rapid increase of cholesterol content in A. galli (Table IX).

Deoxyribonuclie acid (DNA):

1942.35 - 1948.00 µg of DNA per 100 mg (15.83%) of wet weight is estimated from controlled A. galli (Table X). But when this component is calculated in terms of dry weight it shows 4944.48 µg/100 mg (20.99%) dry weight.
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(Table X). After 72 hrs pt. DNA content is noted as 1452.65 - 1720.55 µg/100 mg wet weight and 4233.32 - 4532.22 µg/100 mg dry weight (Table X).

Ribonucleic acid (RNA) :
RNA is very high in A. galli and shows marked variations after in vitro culture. After 24 hrs pt. A. galli shows 2313.33 µg of RNA/100 mg (21.25%) wet weight and at 72 hrs 2055.65 µg RNA/100 mg (21.25%) of wet weight (Table XI). Nematicide treatment causes rapid and significant fall in RNA content in A. galli which is very interesting because the values of RNA content in A. galli after nematicide treatment is reduced approximately to one third of the value of control. After 72 hrs pt. RNA content decreases to 595.35 µg/100 mg (9.09%) wet weight (Table XI).

Ascorbic acid (\textit{i.e.} Vit. C) :
The spectrophotometric analysis of the data of ascorbic acid shows that 12.72 µg ascorbic acid is present/100 mg (0.12%) wet weight in controlled A. galli after 24 hrs of in vitro culture and 52.98 µg/100 mg (0.28%) ascorbic acid present in dry weight (Table XII). The treatment of nematicide causes an extra accumulation of ascorbic acid. The maximum increase is noted only 24 hrs pt. and the data recorded as 29.58 - 34.15 µg/100 mg (0.40%) while after 72 hrs pt. the concentration
is 29.58 - 34.15 μg/100 mg wet weight (Table XII) which is about 4.57 μg less than from the value of 24 hrs nematicide treatment.

B. Some cellular and digestive enzymes of Ascaridia galli:

Glutamate pyruvate aminotransferase (GPT) or L-Alanine:

2 oxoglutarate amino-transferase (E.C. 2.6.1):

The activity of glutamate pyruvate amino transferase (GPT) have been estimated in A. galli and the results obtained are shown in Table XIII. After removal of the parasite from its host the activity of GPT decreases gradually with the passage of time in the in vitro culture like, 24 hrs of cultivation the activity of GPT is 50.10 m units/mg protein/minute while at 72 hrs culture the activity decreases to 45.02 m units/mg protein/minute (Table XIII). The treatment of nematicide causes an extra declination of the GPT activity which is also linearly corelated with the time exposure after the nematicide treatment. After 24 hrs of treatment the GPT activity is 32.39 m units/mg protein/minute but after 72 hrs of treatment GPT activity decreases to 18.16 m units/mg protein/minute (Table XIII).
Glutamate oxaloacetate amino-transferase (GOT) or L-Aspartic acid : 2 oxoglutarate amino transferase :

The glutamate oxaloacetate amino transferase (GOT) activity in *A. galli* is about one sixth of the activity of glutamate pyruvate transaminase (GPT). Like GPT, the GOT activity shows no marked changes during the *in vitro* cultivation. At 24 hrs of culture the activity measures as 8.50 m units GOT activity/mg protein/minute while after 72 hrs of culture the activity is 7.28 m units/mg protein/minute (Table XIV). Treatment of nematicide causes an extra drop in the activity of GOT like GPT. After 24 hrs pt. GOT activity is 4.29 m units/mg protein/minute whereas at 72 hrs pt. the GOT activity again decreases to 3.15 m units/mg protein/minute (Table XIV).

Amylase :

In case of controlled *A. galli* (untreated) 24 hrs after the removal from the host and cultured in the *in vitro* the amylase activity amounts 13.00 m units/mg protein/minute and at 72 hrs it shows 11.08 m units/mg protein/minute (Table XV). Amylase activity also decreases in controlled *A. galli* after prolonged *in vitro* maintenance in the laboratory as shown in case of GPT and GOT. The treatment of nematicide causes the decline of the amylase in the same manner as observed in case of other enzymes. After 24 hrs pt. amylase
activity is 7.35 m units/mg protein/minute while at 72 hrs pt. the enzyme undergoes further declination and the values 6.00 m units/mg protein/minute (Table XV).

Protease:
The proteolytic enzyme activity in *A. galli* is not very high like GPT and GOT and the protease activity gradually increases during *in vitro* maintenance of the nematodes. After 24 hrs of cultivation protease measures 2.80 m units/mg protein/minute activity and at 72 hrs culture it shows a value of 3.58 m units/mg protein/minute (Table XVI). The treatment of nematicide shows a strikingly similar results on protease as shown in case of GOT and GPT i.e. the protease activity significantly decreases in comparison with the controlled following treatment of the nematicide. After 24 hrs of pt. protease activity shows a value of 2.00 m units/mg protein/minute and at 72 hrs pt. the protease activity undergoes further declination and the value appears 1.52 m units/mg protein/minute (Table XVI).

Lipase:
After 24 hrs of cultivation the lipase activity quantifies as 3.54 m units/mg protein/minute and at 72 hrs of *in vitro* culture it is 4.58 m units lipase/mg protein/minute (Table XVII).
Nematicide treatment induces a gradual and significant
decrease in the lipase activity. After 24 hrs pt. the lipase activity measures 2.13 m units/mg protein/minute while at 72 hrs. pt. it decreases further and the value recorded as 1.86 m units/mg protein/minute (Table XVII).

C. Biochemical studies on an index organ of the host i.e. liver:
Total carbohydrate:
In the liver from controlled and non-infected *G. domesticus* it has been found that 6885.33 μg of total carbohydrate present/100 mg of wet weight which is about 33.07% of the all other components. But when this component is expressed in terms of dry weight it shows 13770.66 μg total carbohydrate/100 mg which is about 30.20% of all other components. The liver from *A. galli*-infected *G. domesticus* shows a significant decrease in the total carbohydrate content, i.e. 2739.95 μg of total carbohydrate/100 mg wet weight which is about 8.44% of the all other components; but when it is converted into dry weight basis it shows 5479.90 μg of carbohydrate/100 mg of dry weight and is about 7.48% of the all other components (Table XVIII).
Glycogen:
The glycogen is a part of the total carbohydrate and also presents in major quantity in the liver from both infected and non-infected G. domesticus. In the liver from non-infected G. domesticus 380.36 μg/100 mg wet weight which is about 1.83% of the all other components and on dry weight basis 950.90 μg/100 mg dry weight which is about 2.09% of the all other components. In case of A. galli infected G. domesticus, the glycogen concentration of liver drops significantly in comparison from non-infected condition which is about 0.66% in wet weight and 0.59% in dry weight basis (Table XIX).

Total protein:
The most important and structural component of the liver, the total protein estimation shows that like other components the total protein also changes its amount both in infected and non-infected liver of G. domesticus. In case of non-infected G. domesticus the liver has 1641.78 μg/100 mg wet weight which is about 7.88% of the all other components estimated in the present experimental study. But when the same is expressed in terms of dry weight it shows some different result i.e. 4104.45 μg total protein/100 mg dry weight which is about 9.00% of the other components estimated in this present experimental studies (Table XX).
Similarly in case of *A. galli* -infected *G. domesticus*, the quantitative analysis of the total protein in liver demonstrated that, the protein concentrations in the liver increases rapidly and significantly in comparison to that of the non-infected *G. domesticus* liver. In case of infected *G. domesticus* liver the protein concentration is 4522.42 µg/100 mg wet weight and 11306.05 µg/100 mg dry weight which are 13.93% and 15.43% respectively of the all other components (Table XX). The total increases in the amount of total protein concentration in the liver of *A. galli* infected *G. domesticus* is about 6.05% on the wet weight basis and 6.43% on the dry weight basis.

**Free amino acid (F AA):**

The free amino acids concentration in the liver from non-infected *G. domesticus* is about 656.71 µg/100 mg wet weight and 1970.13 µg/100 mg dry weight which are about 3.15% and 4.32% respectively (Table XXI). Like the total protein concentrations, the free amino acid contents of liver also changes after the infection of *A. galli*. In the *A. galli* infected *G. domesticus* liver has the free amino acid value of about 1808.97 µg/100 mg wet weight which is about 5.57% of the all other components estimated in this study (Table XXI). So, the total increases of the free amino acid concentrations
in liver of *G. domesticus* after nematode infection is about 2.42% regarding wet weight basis.

**Total lipid**:  
3258.29 μg total lipid present in the liver from non-infected *G. domesticus*/100 mg of wet weight which is about 15.65% of the all other components estimated in this present experimental studies. Infection of *A. galli*, augments the values representing 8721.00 μg/100 mg wet weight which is about 26.86% of the other components. When this concentrations is expressed in the dry tissue weight basis, the total lipid concentration is values 19186.20 μg/100 mg dry weight which is about 26.19% of the other components (Table XXII).

**Phospholipid**:  
Phospholipid is a fractions of the total lipid and also present in the liver of *G. domesticus* in major quantities. Analysis of this fractions of lipid components shows that 812.56 μg of phospholipid present/100 mg wet weight in the liver from non-infected *G. domesticus* which is about 3.90% of the other components. When expressed in the dry tissue weight basis, this value presents 1787.63 μg/100 mg dry weight which is about 3.93% of the other components. The
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Phospholipid concentration in the liver from *A. galli*-infected *G. domesticus* increases in comparison to the values of non-infected liver. 3214.92 μg of phospholipid estimated in the liver of infected *G. domesticus*/100 mg wet tissue weight and 6429.84 μg/100 mg dry tissue weight which are almost about 9.90% and 8.78% of the other components estimated in this present experimental studies respectively (Table XXIII).

**Free Fatty Acid (FFA):**

This fraction of the lipid components shows the most significant values. It has been found that 1356.60 μg of FFA present/100 mg (6.51%) wet weight of liver in non-infected *G. domesticus*. In terms of dry weight it amounts 2577.54 μg/100 mg (5.65%). Due to the infection of *A. galli*, this free fatty acid concentrations in the liver of *G. domesticus* is found to increase amounting 1995.78 μg/100 mg (6.15%) wet weight and 4390.72 μg/100 mg (5.99%) dry weight respectively (Table XXIV).

**Cholesterol:**

In case of non-infected *G. domesticus*, the liver shows 1122.16 μg of cholesterol/100 mg wet tissue weight and 2859.52 μg/100 mg dry tissue weight which are 5.39% and 6.27% respectively.
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in respect of all other components estimated in this experimental studies (Table XXV). While the liver from the *A. galli-* infected *G. domesticus* shows a significant increases in the amount of cholesterol in the liver, viz. 1860.23 µg of cholesterol/100 mg (5.73%) of wet weight and 5924.45 µg/100 mg (8.09%) dry weight (Table XXV). The most interesting observations during the estimations of different lipid and sterol fraction in the liver of both infected and non-infected *G. domesticus* is that irrespective of the quality of lipids and sterols all the fractions increases after the infections of *A. galli* (Table XXII – XXV).

**Deoxyribonucleic acid (DNA):**

The Deoxyribonucleic acid content of the non-infected *G. domesticus* liver is about 1750.84 µg/100 mg (8.41%) wet weight. On the dry tissue weight basis, DNA content in liver shows some differential results viz. 3660.78 µg/100 mg (8.03%) of dry weight. *A. galli* infection in the *G. domesticus* causes a slight increases in the Deoxyribonucleic acid content in the liver, though this increase is not statistically significant (P/0.05) in comparison to the control or non-infected *G. domesticus* liver. The Deoxyribonucleic acid content of liver from infected *G. domesticus* is about 1956.93 µg/100 mg wet tissue.
weight which is about 6.03% of all other components measured in this study while this deoxyribonucleic acid content is converted into dry tissue weight basis it shows 5.20% of the other components estimated. The log values of the data obtained from both non-infected and infected liver is about log 3.24 and log 3.29 respectively on the wet tissue weight basis (Table XXVI).

Ribonucleic acid (RNA):
Spectrophotometric analysis of the Ribonucleic acid concentration shows that in case of non-infected G. domesticus liver has the 2958.13 μg/100 mg (14.21%) of wet weight (Table XXVII). Relative to dry weight basis, the Ribonucleic acid in non-infected G. domesticus liver shows 7395.28 μg/100 mg (16.22%) dry weight (Table XXVII). A. galli infection in G. domesticus causes the rapid and statistically significant (P<0.01) increase in the concentration of total Ribonucleic acid in liver and this is about 2-3 fold in comparison to the control or non-infected ones. The data obtained are 5438.26 μg/100 mg (16.75%) wet weight and 10876.52 μg/100 mg (14.85%) of dry weight (Table XXVII).
D. Some cellular enzymes level in the liver:

L-alanine : 2 oxoglutarate amino transferase or glutamate pyruvate transaminase (GPT):

Apart from the carbohydrate and lipid metabolism, liver of vertebrates also acts as an important centre for the metabolisms of protein components and the reactions like transamination, deaminations are also going on regularly in the vertebrates liver. Quantitative analysis of the glutamate pyruvate transaminase (GPT) activity in the liver from non-infected G. domesticus shows that about 109.27 m units enzyme activity present/mg protein/minute, the log value of this datum is about log 2.03 which is again 75.59% of the total GPT and GOT activity in the liver of non-infected G. domesticus (Table XXVIII). After the infection of A. galli into G. domesticus, the activity of glutamate pyruvate aminotransferase (GPT) markedly and statistically significant (P<0.01) increases in the liver. The results obtain from quantitative assay methods reveals that only about 357.66 m units enzyme activity present/mg protein/minute which is of 76.02% activity from the total GPT and GOT activity in liver (Table XXVIII).
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L-Aspartic acid 2 oxoglutarate aminotransferase or glutamate oxaloacetate transaminase (GOT):

Glutamate oxaloacetate transaminase (GOT) activity in the liver of non-infected Gallus domesticus is about one third of the activity of glutamate pyruvate transaminase (GPT). The data obtained by spectrophotometric analysis shows that about 35.28 m units GOT activity present/mg non-infected liver protein/minute which is about 24.41% of the total GPT and GOT activity. The log values of this datum is about log 1.54. After the infection of A. galli into G. domesticus, the GOT activity of the liver shows marked and significant increases (P<0.01) like that of GPT activity and the results obtained are the 112.84 m units/mg protein/minute (Table XXIX) which is about 23.98% of the total activity of the both GPT and GOT.