

more suspicion, superstition and with old presumption. In India weaning of lambs has not been taken up seriously as is being done with various flocks abroad.

The review points out the dearth of information on our native breeds and their crosses with exotic breeds and about the insufficient attempts for studying the usefulness of weaning in our country.

M. NARAYANASWAMY

KDDC, Central Office,  
Bangalore 560027.

Received : 23 September, 1977.

- <sup>1</sup> R. M. Acharya and S. J. S. Bawa, *Indian J. Agri. Sci.* **41**, 572, 1971.
- <sup>2</sup> C. R. Barnicoat, P. F. Murray, E. M. Roberts and G. S. Wilson, *J. Agri. Sci.*, **41**, 577, 1957.
- <sup>3</sup> M. J. Burries and Baugus, *J. Agri. Sci.* **14**, 186, 1955.
- <sup>4</sup> I. E. Coop, *J. Agri. Sci.*, **40**, 311, 1950.
- <sup>5</sup> J. M. Doney and J. Munro, *Anim. Prod.* **4**, 215, 1962.
- <sup>6</sup> J. B. Owen, *J. Agri. Sci.* **40**, 387, 1957.
- <sup>7</sup> G. D. Sacker and J. C. M. Trail, *J. Agric. Sci.*, **67**, 93, 1966.
- <sup>8</sup> O. N. Seth, M. D. Pandey and A. Roy, **48**, 9, 1971. *Indian J. Anim. Sci.*
- <sup>9</sup> V. K. Singh, S. B. Tiwari, L. B. Singh and J. Honmode, *Indian. Vet. J.* **50**, 1199, 1973.
- <sup>10</sup> K. Sugai and K. Teramoto. *Sci. Rep. no. 11*, Fac. Agric. Ikoyama, Univ. (Vide. Anim. Breed, Abstr. 26 : 409). 1958.
- <sup>11</sup> W. Thomson and A. M. Thomson, *Brit. J. Nutr.* **7**, 263, 1953.
- <sup>12</sup> I. D. Wardrop and J. B. Coombe, *J. Agric. Sci.* **54**, 140, 1960.
- <sup>13</sup> W. L. Williams. The diseases of genital organs of domestic animals. 3rd Ed. Ethel William Plimton. Worcester, Mass. 1947.

### Blood Sugar Estimation in the Estuarine Crab *Scylla serrata* (Forsk.)\*

The sugar in the blood of crustacea represents an energy source for tissue metabolism as is the rule in other animals. The wide range of composition of blood values obtained for reducing substances

\* This study formed as a part of the dissertation submitted in the partial fulfilment of the requirements for the M.Sc. degree from Annamalai University, 1967.

in crustacean blood suggest that the physiological condition of the animal influences the blood sugar values<sup>1</sup>.

Some aspects of biology, fishery, histochemistry, physiology, rate of survival and culture in the estuarine crab *Scylla serrata* (Forsk.) were available from earlier literature<sup>2-11</sup>. As there was no emphasis on blood sugar estimation in this species in earlier accounts, an attempt has been made in the present communication to give some information on this subject.

The estuarine crabs of the species *Scylla serrata* (Forsk.) were collected alive from the Vellar Estuary of Porto Novo (C11° 29'N 79° 49'E) on the east coast of India.

In an experiment, 1 ml of blood from the living crab *S. serrata* was mixed with 7 ml of water in a flask. 1 ml. of 10% solution of zinc sulphate was added to the aliquot. While shaking continuously, 1 ml of 0.5 N NaOH was added. The flask was closed with a stopper, shaken well and filtered for a few minutes through a dry filter paper. Protein was precipitated with barium hydroxide and the protein free filtrate was collected. 5 ml. of copper reagent was poured into a large test tube and 5 ml of protein free filtrate was then added to it. After proper shaking, the tube was covered with a small funnel and kept in a boiling water bath for 15 minutes. Then it was cooled under the tap water. When the temperature of the solution came down to about 40°C, 1 ml of 5N H<sub>2</sub>SO<sub>4</sub> was added to dissolve all the copper oxide produced. After about 2 minutes, it was titrated with 0.005% sodium thiosulphate solution, using starch as indicator. Towards the end of the titration a blank with 5 ml. of reagents was used and no blood filtrate was used. From the difference between the titre values of the blank and experimental sample, the glucose equivalent was determined. From this, the percentage of glucose contents in the blood was calculated.

TABLE 1 : Blood sugar content in *Scylla serrata* (Forsk.)

Ml. of 0.005 Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> used	Vol.	Difference	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> equivalent	Glucose equivalent
Blank	21.1			
		4.5	4.5	124 mg/100 ml (whole blood)
Experiment	16.6			

It was estimated from the present experiment that sugar content of the blood in *S. serrata* was 124 mg/100 ml.

*Scylla serrata* (Forsk.) which can tolerate a wide range of salinity has been found to regulate its blood calcium and sugar with the dilution of the medium. The fall of blood sugar level in fasting *Carcinus maenas* outside the moulting period as observed by Kleinholz *et al.*, substantiated the present findings in *S. serrata*<sup>12</sup>.

I am grateful to Prof. R. V. Seshiya, (Late) Director and Dr. V. K. Venugopalan, Reader, Department of Marine Biology (Annamalai University), Porto-Novo for their keen interest and encouragement.

P. NAMMALWAR

ICAR Regional Centre for Central Marine Fisheries Research Institute,  
Marine Fisheries P. O.  
Mandapam Camp,  
Tamilnadu.

Received : 10 September, 1977

Revised : 17 August, 1978

- <sup>1</sup> Talbot H. Waterman, The physiology of crustacea Vol. I. Metabolism and growth, 1960, p. 141-159. Academic Press, New York.
- <sup>2</sup> D. D. Rekha, Some aspects of biology of the marine crab, *Scylla serrata* (Forsk.). Ph.D. thesis, University of Bombay, 1968.
- <sup>3</sup> D. Rajasingh Joel, Studies on the biology and fisheries of the edible Portunid crabs of the Pulicat Lake. Ph.D. Thesis, University of Madras, 1973.
- <sup>4</sup> P. G. Renganekar, *J. Anim. Morph. Physiol.*, 1, 62-64, 1954.

- <sup>5</sup> P. G. Renganekar, *Zool. J. Linn. Soc.* 57 (1), 75-84., 1975.
- <sup>6</sup> P. G. Renganekar, et. al. Histochemical observations on the occurrence of glycolytic and pentose polycycle enzyme in hepatopancreas and their possibilty to eyestalk factors. *L. Mikrosk Anat. Forsch (Leipz)*, 89 (1) : 128-142, 1975.
- <sup>7</sup> K. R. Menon and Sivadas, Blood sugar regulation in the crab *Scylla serrata* 1. Effect of injection of eye-stalk extract. *Indian J. Exptl. Biol.* 5, 176-178, 1967.
- <sup>8</sup> K. R. Menon and Sivadas, Hormonal control of blood calcium and sugar levels in the estuarine crab *Scylla serrata* (Forsk.). *Proc. Indian Academy Sciences. Vol. LXVII, Section B. No. 3* : 132-138, 1968.
- <sup>9</sup> K. R. Menon, Mechanism of salinity tolerance in an estuarine crab *Scylla serrata* (Forsk.), 1968. (In Press)
- <sup>10</sup> R. B. Vasudev and H. G. Kewalramani, Transport of the common crab (*Scylla serrata*) in living condition. *Indian. J. Fish.* 7, 169-173. 1960.
- <sup>11</sup> M. Kathirvel, Culture of other crustaceans. Summer Institute in Coastal aquaculture, Central Marine Fisheries Research Institute, Cochin-18. 1974.
- <sup>12</sup> L. M. Kleinholz, V. J. Havel and R. Reichart, Studies in the regulation of blood sugar concentration in crustaceans. *Biol. Bull.*, 99, : 454-468, 1950.

### Effects of Growth Regulators on Growth Development and Yield of *Abelmoschus esculentus* (L) Moench (Lady's finger).

The use of growth regulators for controlling fruit set and maturation, altering fruit size and improving its quality and development has become an important tool in the hands of agriculturists. Various