

Examination of diagnostic values achieved by alternatively applying both trichinoscopy and artificial digestion methods as well as of diagnostic values of some muscles of hogs artificially infected by larvae *T. spiralis*

P. MODIĆ, M. DJORDJEVIĆ

Yugoslav Institute of Meat Technology, Belgrad

There are, few of methods which are used for proving trichinosis in hog slaughterhouses and processing plants. Trichinoscopy is considered as one of the most reliable and most simple methods used in everyday practice (Prost 1960, Hermus and Stier, 1963, Kozar 1962, Wagemann 1966, Matov 1967).

Due to the perfection of the artificial digestion - it was seriously opposed to the trichinoscopy even in those conditions under which the hogs were routinely controlled. Most of previous examinations proved that the artificial digestion had some advantages over the trichinoscopy (Hill 1957, Bessonov 1964, 1966) and particularly in detecting weak intensity infections with the possibility of a simultaneous examination of a number of samples collected from several hogs. On the other hand many data referring to the corresponding literature confirm that, as a rule, the greatest number of *T. spiralis* is detected in the muscle tissue of the diaphragm root. As far as the results of the diagnostic value of the other parts of the trichinous hogs are concerned the results are contradictory (Kosmikov 1959, Olsen et al. 1964, Matov and Komandarev 1967) and that is why it is difficult to decide which of the muscles are to be taken for the purpose of examination in case the diaphragm root is missing.

Taking into account the fact that the trichinoscopy is replaced by the method of a quick artificial digestion of pork samples at a routine examination at the plants is nowadays widely discussed in many countries, we have set ourselves the task of examining the comparative efficiency of both the trichinoscopy and the artificial digestion with the regard to larvae

detection in meat of the hogs which were artificially infected by a certain count of larvae *T. spiralis*.

Trichinoscopy the trial hogs we have examined the encapsuled *T. spiralis* larvae in 11 of the selected muscles as well as in the musculous part of the oesophagus with the purpose of comparing their diagnostic values with those obtained from examining the muscles of the diaphragm. Besides, we wanted to examine the encapsuled *T. spiralis* larvae of the peripheral diaphragm muscle parts (Pars costalis diaphragmatis) and the diaphragm (Crura diaphragmatis) as well as the peripheral (Apex linguae) and central (M. genioglossus) parts of the tongue.

#### MATERIAL AND METHODS

For the purpose of the trial there were singled out 13 pigs which we divided into experimental groups and thereafter infected by *T. spiralis* larvae (100 to 20 000 larvae per a pig). They were slaughtered after 30, 60, 90 and 110 days from the beginning of the trial. During that time the mass of the pigs was increased from 60 to 200 percent. After cooling the tissue samples were taken from a particular muscle - for the trichinoscopy examination totalling up to 1 g, and for the purpose of the digestion method 5 g. There were 56 preparations made from the sample taken for the examination by using trichinoscopy which were then carefully examined by the trichinoscope Ernest Leitz 0X Q. The digestion of the samples was performed partly by modified method, the digestive fluid composed of 9 g of pepsin (1:10 000 I.J), 0,7 ml of HCl and 98,4 ml of the destilled water. We put the well minced samples of the muscle tissue into the glasses and poured 75 ml of the destilled fluid over it (the ratio 1:15) and left it in a thermostat for 20 h at 37°C by mixing the content from time to time. After centrifugation and draining of the digestive fluid in each of the cells of the centrifugal machine remained 3 ml of the sediment which we homogenized and thereafter a certain quantity of it we put onto the suitable trichinoscopic glasses and carefully examined by the trichinoscope enlarging the picture for 80 times. After the detected larvae were counted by applying both



of the methods referred to, we recounted them in 1 g of the sample of each of the examined muscles.

## RESULTS AND DISCUSSION

The results of the examination of larvae detected by each of the diagnostic methods in 1 g of the tissue taken from the three selected muscles belonging to each of the trial groups are presented in the table 1.

The results indicate that we have, applying each of the diagnostic methods, detected larvae *T. spiralis* in 1 g of muscles of the diaphragm, root, the tongue and the thigh, even in slightly infected hogs. With the exception of four hogs, more of the larvae were detected, by applying digestion than the trichinoscopy. The tissue of the diaphragm root (*Crura diaphragmatis*) and of the central part of the tongue (*M. genioglossus*) practically contain an approximately equal count of the encapsuled larvae whereas the muscle tissue of the thigh (*M. quadriceps femoris*) contains a considerably lower count of it. There was observed that the total of the larvae *T. spiralis* detected in individual trial groups of hogs is not proportionate to the count of the given larvae.

Viewing the total of the larvae detected by the application of both trichinoscopy and digestion it becomes obvious that in the diaphragm root there were detected only 30 percent of the parasites more than in the tongue. Applying the method of the artificial digestion in the muscle of the tongue there were found even more of the *T. spiralis* larvae than in the diaphragm root. But, irrespective of the method applied in the muscle tissue of the thigh there were detected three times less of the larvae than in the diaphragm root. In order to draw a distinction between the diagnostic value of the trichinoscopy method and that of the artificial digestion we have presented the results of the total count of larvae detected in the diaphragm root of, than in the central part of the tongue and in the thigh muscle of. The results indicate that by applying the digestion method there were detected 22,36 percent more of the

larvae in all three muscles than by applying the trichinoscopy. At the same time the diagnostic value of the *M.genioglossus* was practically equal to the diagnostic value of the *Crura diaphragmatis*. (Graph. 1).

The results of the examination of the larvae detected in the samples of the selected muscle tissue as well as in the oesophagus muscle tissue, by comparing them with the count of the *T.spiralis* larvae detected in the root of the diaphragm (which is considered as 100%) are presented in the graph. 2.

It is obvious that a higher degree of reliability of the examination of meat of the trichinelous hogs can be expected only by using the muscle tissue of the diaphragm and that of the tongue. There is a considerably smaller possibility of detecting the larvae by using other muscles of the infected hogs for the purpose of examination. Among the muscles examined the highest count of the encapsuled larvae was detected in *M.psoas major* and lowest one in *M.longissimus dorsi*. The examinations have also shown that the *Mm. intercostales* contain about five times lower count of the *T.spiralis* larvae than the diaphragm root. Having in mind that the obtained results have shown that in the muscle tissue of the diaphragm root and in the tongue there is a considerable bigger number of the encapsuled larvae than in the rest of the muscles we had examined in five of the selected trial hogs with the purpose to find out whether some parts of the diaphragm and that of the tongue have a different or an equal diagnostic value. The results of the examination of the larvae in the peripheral as well as in the central parts of the diaphragm and that of the tongue are shown in the table 2.

On the basis of the obtained collective results in each of the hogs from each of the groups it was obvious that a greater count of the larvae *T.spiralis* was found in the peripheral diaphragm muscle parts (*Pars costalis diaphragmatis*) than in the diaphragm root though such a finding was not characteristic for every individual trial hog. The results indicate that the count of larvae detected in the peripheral part of the tongue muscle (*Apex lingue*) was consi-

Count of larvae *T.spiralis* in 1 g of muscle tissue of diaphragm, tongue and thigh of hogs taken from trial group I, II, III, IV and V

Table 1.

Examined muscles	Diagnostic method	Count of larvae detected in hogs designated by												
		I			II			III			IV			V
		1	11	111	2	22	222	3	33	333	4	44	444	5
Crura diaphragmatis	trichinoscopy	24	20	3	68	23	13	556	458	186	1648	481	188	972
	digestion	30	10	7	84	55	14	737	450	195	2012	950	201	998
M.genioglossus	trichinoscopy	23	14	12	43	24	10	449	346	172	1133	372	181	1496
	digestion	42	18	9	66	25	12	364	350	175	2200	645	275	1612
M.quadriceps femoris	trichinoscopy	10	5	2	20	9	2	180	136	93	230	198	21	523
	digestion	16	12	3	30	20	3	191	166	110	332	240	44	619

Count of larvae *T.spiralis* in 1 g muscle tissue of different parts of diaphragm and tongue

Table 2.

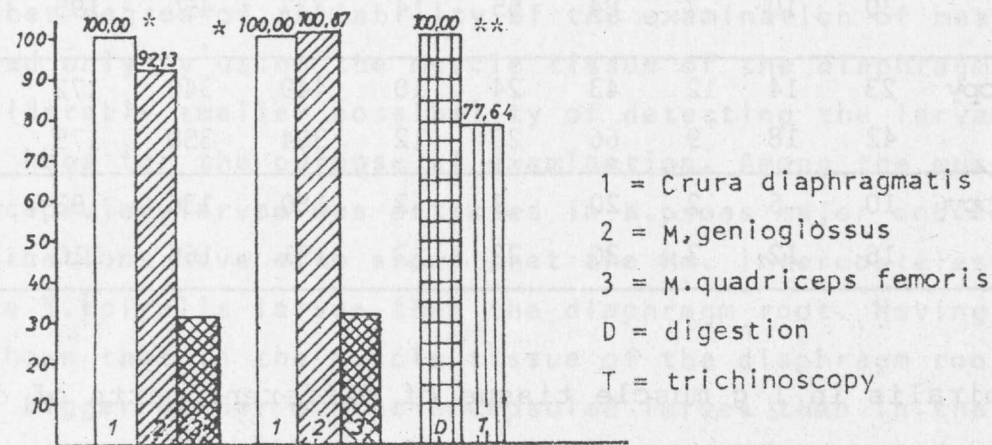
Examined muscles	Part of examined muscle	Count of detected larvae in hogs designated					Total count of detected larvae	Correlation between total count of detected larvae, %
		111	222	3	444	5		
Diaphragm	Crura diaphragmatis	3	13	556	188	972	1732	100,00
	Pars costalis diaphragmatis	6	12	564	168	1010	1760	101,61
Tongue	M.genioglossus	12	10	449	181	1496	2148	100,00
	apex linguae	10	10	434	208	738	1400	65,17

\*Count of larvae in crura diaphragmatis or in M.genioglossus, taken as 100,00.



Graph. 1.

Comparison of diagnostic value of Crura diaphragmatis to that of M.genio-  
glossus and M.quadriceps femoris as well as the efficiency of digestion  
and trichinoscopy methods based on the count of larvae T.spiralis detected  
in trial hogs

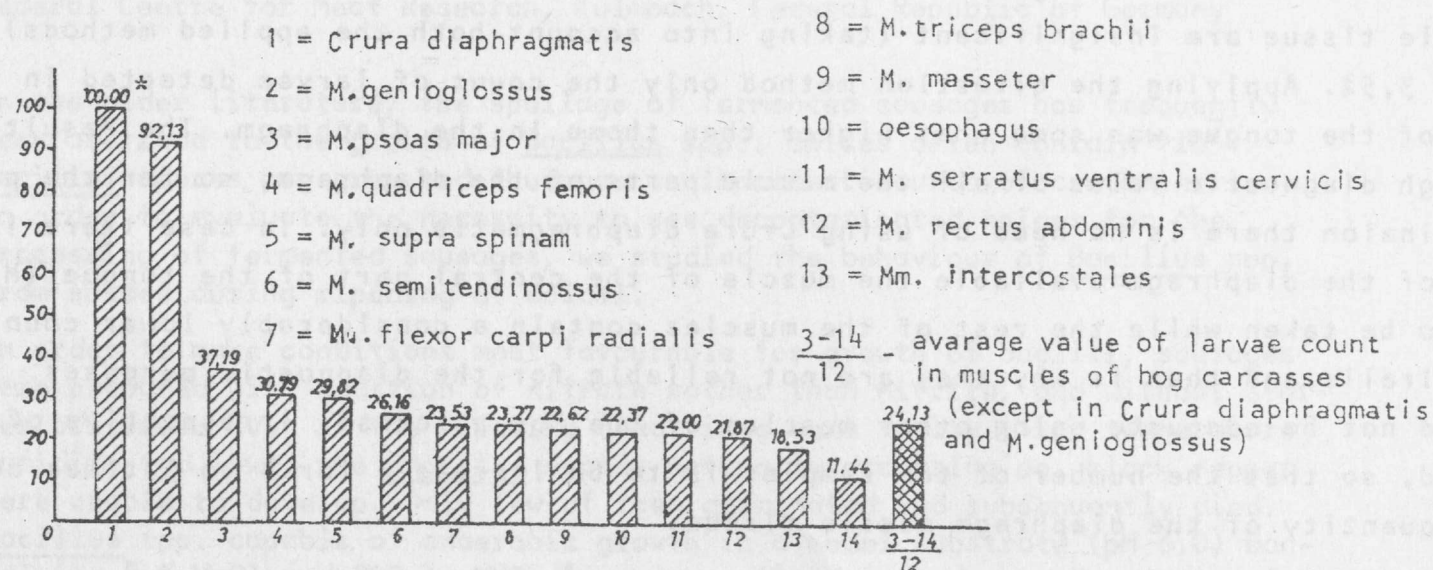


\* - count of larvae in Crura diaphragmatis taken as 100,00

\*\* - count of larvae detected by digestion taken as 100,00

Graph. 2.

Correlation of count of larvae *T. spiralis* detected in individual muscles of trial hogs determined by trichinoscopy



\*-Count of larvae *T. spiralis* in Crura diaphragmatis taken as 100,00

derably lower than the count of larvae detected in the central tongue muscle (*M.genioglossus*). The results reveal a considerable advantage of the artificial digestion method over that of the trichinoscopy (the efficiency is higher for more than 22 percent) in detecting larvae *T.spiralis* in the meat of infected hogs provided that both of the methods mentioned are carried out carefully and with the purpose to detect all of the existing larvae. The results we came to also reveal that the diagnostic value of the diaphragm muscle tissue compared with the tongue muscle tissue are insignificant (taking into account both the applied methods) and amounts to only 3,5%. Applying the digestion method only the count of larvae detected in the muscle tissue of the tongue was somewhat higher than those in the diaphragm. The results indicate to a high diagnostic value of all the muscle parts of the diaphragm, so for the purpose of the examination there is no need of using *Crura diaphragmatis* only. In case there is no muscle tissue of the diaphragm available the muscle of the central part of the tongue (*M.genioglossus*) is to be taken while the rest of the muscles contain a considerably lower count of the larvae *T.spiralis* and that is why they are not reliable for the diagnostic purposes. The results would not be adequate using other muscles of the hog carcasses irrespective of the method applied, so that the number of the samples is to be increased for 4 to 5 times compared with the quantity of the diaphragm muscle tissue.

#### REFERENCES:

1. Bessonov, A.S. (1964): *Veterinaria*, Moscow, 41, 85;
2. Bessonov, A.S. (1966): *Med.Vet.*, Bucurest, (Caiet Selectiv, I.D.T), 3, 114;
3. Hermus, G., and Stier, R. (1963): *Mhefte, Vet.Med.*, 20, 350;
4. Hill, C.H. (1957), *J.Parasitol*, 43, 574;
5. Kosmikov, N.E. (1959): *Veterinaria*, Moscow, 36, 9, 52;
6. Kozar, Z. (1962): *Proc.I.Int.Conf. on Trich.* 15, Warszawa;
7. Matov, K. (Komandarev, S. (1963): *Zschr.Parasitenkd.* 23, 3, 197;
8. Matov, K. (1967): *Veterinaria*, Sarajevo, 16, 2, 163;
9. Olsen, B.S., Villella, J.B., Gould, S.E. (1964): *J. Parasitol.* 50, 489;
10. Prost, E. (1960): *Arch.Lebensmittelgyg.* 13, 223;
11. Wagemann, H. (1966): *Fleischwirtsch.* 46, 841.