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CAPACITY OF ACCREDITED DIAGNOSTIC TESTING VETERINARY LABORATORIES IN BOSNIA AND HERZEGOVINA IN 2017, FROM THE STANDPOINT OF DIAGNOSTIC TESTS IN VETERINARY MEDICINE, IN RELATION TO FIELDS OF ACCREDITATION

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Abstract: Accreditation refers to the formal recognition that a confirmity assessment body (laboratory) is competent to conduct confirmity assessment activities according to internationally accepted rules. The accreditation of conformity assessment bodies in Bosnia and Herzegovina (B&H) is implemented by the Institute for Accreditation of B&H (BATA). Accreditation provides confidence in the laboratory test results.

Veterinary laboratories for diagnostic testing refer to laboratories for testing materials of animal origin.

The aim of the study is to determine the capacity of accredited diagnostic veterinary laboratories for diagnotic testing in B&H in relation to the field of examination or the scope of accreditation.

This enables a clear insight into the capacity of diagnostic veterinary laboratories to respond to animal health control requirements in order to protect animal and human health.

During 2017, six diagnostic veterinary laboratories were accredited in Bosnia and Herzegovina, three in Republika Srpska and three in the Federation of B&H.

Of the seven accredited fields of testing in B&H, laboratories in Rebublika Srpska accredited all seven fields (100%), while laboratories in the Federation of B&H accredited six fields (85.70%). The veterinary laboratories for diagnostic testing in B&H accredited a total of 42 different test methods. In the RS 30 test methods were accredited (71.40%), while in the Federation of B&H there are 31 accredited test methods (81.60%).

When it comes to various fields of veterinary diagnostic tests, B&H has the capacity concerning accredited laboratories to respond to the reqirements , capacities of particular significance are those for serological (100% accredited laboratories),

bacteriological (66.70% of accredited laboratories) and parasitological tests (50% of accredited laboratories). In relation to the total number of test methods regarding type of animals, the most test method are accredited for diagnosis of cattle diseases (in the RS 36.70%, in the FB&H 38.70%, and at the B&H level 33.30%), they are followed by the methods for diagnosis of sheep and goat diseases and bird diseases.

Key words: accreditation, testing laboratories, veterinary diagnostic.

INTRODUCTION

Accreditation of the conformity assessment body in Bosnia and Herzegovina (B&H) is carried out by the Institute for Accreditation of B&H (BATA) (12). BATA is responsible for developing, implementing and maintaining B&H Accreditation System (SAB&H), implementing the accreditation and supervision procedure of the conformity assessment body, representing B&H in European and international organizations for accreditation, organizing and implementing specialist staff training in the field of accreditation, and developing and establishing information system on assigned accreditions and on documents in the field of accreditation.

Accreditation is a document that demonstrates competence to perform certain tasks in the area of assessment of compliance (8). Accreditation implies a formal acknowledgment that some conformity assessment body is competent to carry out conformity assessment activities in accordance with internationally accepted rules. Conformity assessment is any activity through which it is directly or indirectly determined whether the relevant requirements have been met. Conformity assessment body is a supplier-independent laboratory, certification body, inspection body or any other body involved in conformity assessment which can be a state authority or a legal or natural person. The accreditation procedure determines the competence of legal and natural persons, which can represent, in whole or in part, a conformity assessment body in relation to the requirements of B&H, European and international standards or documents of European and international accreditation organizations.

BATA sets out the criteria for approving and maintaining accreditation to be met by the Compliance Assessment Bodies (TOU), the process of accreditation and the financing of the accreditation system (15) Laboratory accreditation ensures confidence in the results of laboratory tests, and is carried out according to the standard BAS EN ISO / IEC 17025: 2006 (1). Within the SAB&H, test laboratories, calibration laboratories, medical laboratories, inspection bodies, product certification bodies, staff certification bodies and

bodies providing certification of the management system can be accredited.

Diagnostic veterinary laboratories refer to laboratories dealing with the testing of material originating from animals (9-11) These are the laboratories that carry out diagnostic tests of infectious diseases, the detection of potentially harmful residues in animals and products of animal origin, water and animal feed , food and animal feed hygiene, health and quality testing, and other tests (13) that is, bacteriological, serological, parasitological, chemical, biochemical, physical, pathological and radiological tests in the veterinary field, testing of the health safety of food of animal origin and animal feed (11).

Diagnostic veterinary laboratories must accredit the methods they use in accordance with the standard BAS EN ISO / IEC 17025: 2006 (11, 14) Diagnostic testing in veterinary medicine in B&H is carried out by authorized laboratories in state (SO) and private ownership (PO) in both Entities, Republika Srpska (RS) and Federation of Bosnia and Herzegovina (FB&H), in accordance with the Veterinary Law (9-11) and other regulations. No veterinary diagnostic laboratory has been accredited in the Brcko District (BD).

OBJECTIVES AND TASKS OF TESTING

The aim of the study is to determine the capacities of the accredited veterinary diagnostic testing laboratories in B&H in relation to the field of testing from the standpoint of diagnostic testing in veterinary medicine. In this way, we would get a clear insight into the readiness of diagnostic testing veterinary laboratories to respond to animal health control requirements with the aim of protecting animal and human health. Data on accredited areas and test methods related to food and animal feed control have not been taken into account in this study.

MATERIAL AND METHODS

Material

As a test material, Annex to Accreditation Certificate of Accredited Testing Laboratories in B&H in B&H was used, downloaded from the BATA website (57).

Laboratories on the RS territory:

State Ownership (SO)

1. PI Veterinary Institute of the Republic of Srpska “Dr Vaso Butozan”, Banja Luka (2)

II Private Ownership (PO)

1. Veterinary Institute “Teolab”, Bijeljina (3)

2. Slaven d.o.o. Veterinary Institute, Banja Luka (4)

Laboratories on the FB&H territory:

State Ownership

1. Public institution "Veterinary Institute" Bihać, Bihać (5)

2. Veterinary Faculty of the University of Sarajevo, Sarajevo (6)

3. PI "Veterinary Institute of Tuzla Canton", Tuzla (7)

The laboratories are displayed according to the registered name and headquarters of the legal entity, without mentioning their regional locations and organizational units that are accredited.

Methods

In our research and in the statistical analysis of the obtained results we used descriptive statistical parameters as basic statistical methods. These parameters enable the description of the obtained results and their interpretation. The results of the research are presented in a tabular and graphical form. Statistical analysis of the results was done in the Microsoft Office Excel statistical software

RESULTS AND DISCUSSION

In Bosnia and Herzegovina there are 6 accredited diagnostic testing veterinary laboratories (ADVL), three in the RS and three in the FB&H, while there are no ADVLs in the Brcko District (BD) (Table 1). Of these, one ADVL is an educational and scientific institution (6), three are public institutions (2, 5, 7), all four of them are in SO, while the remaining two are privately-owned ADVLs (3, 4). When it comes to public institutions, one is specialist and scientific institution organized as a veterinary institute (2), while the other two, as well as two in PO, are organized as veterinary institutes (3-5, 7). The ratio of ADVLs between entities (RS to FB&H) is 1: 1.

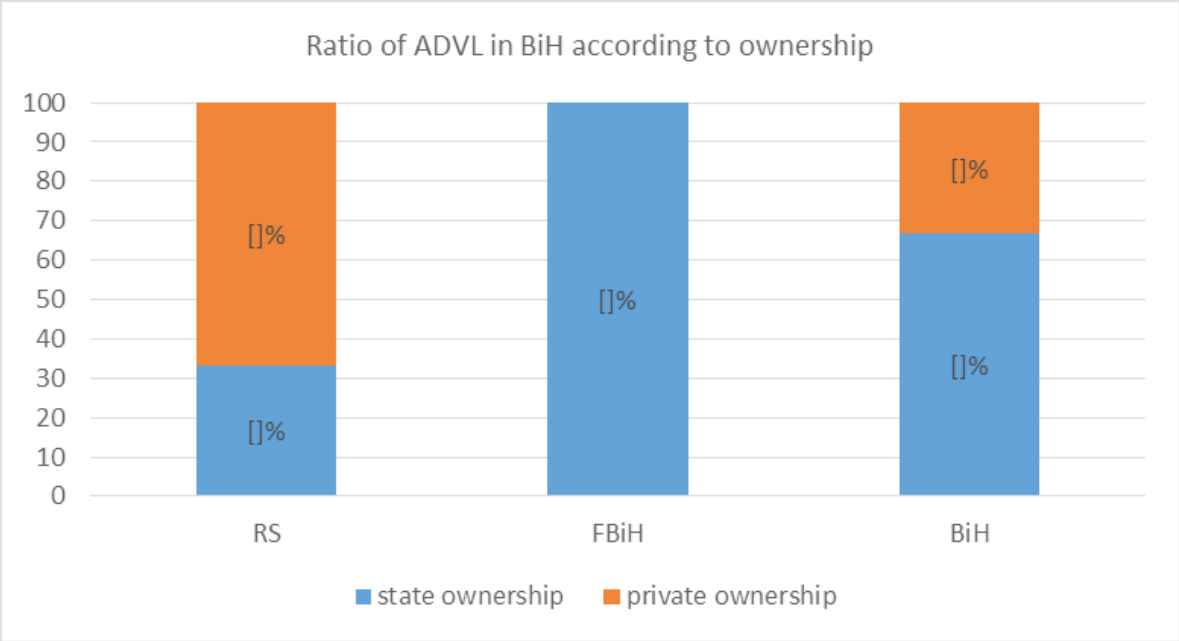
Table 1. Accredited diagnostic testing laboratories in B&H

Location	Number of ADVL	%
RS	3	50
FB&H	3	50
BD	0	0
Total B&H	6	100

Table 2 and Graph 1 show the numerical and percentage ratio of ADVLs in B&H according to ownership

Table 2. numerical ratio of ADVLs in B&H according to ownership

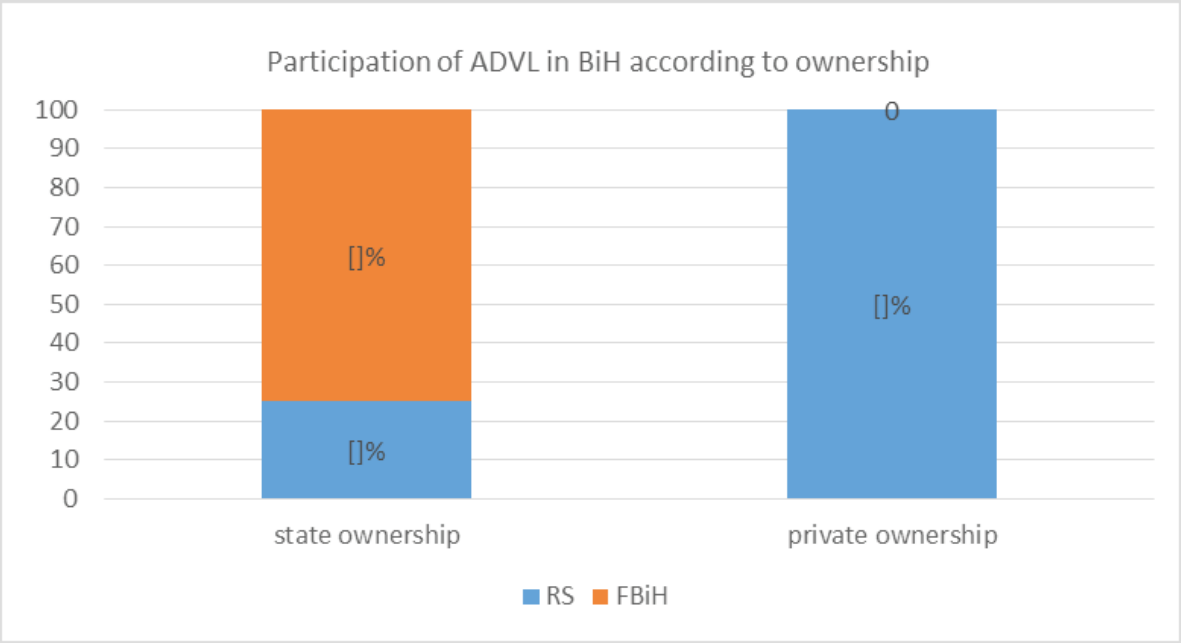
Location	Number	
	SO	PO
RS	1	2
FB&H	3	0
B&H	4	2



Graph 1. Ratio of ADVLs in B&H according to ownership

In RS, 33.30% of ADVLs are in SO, compared to 66.70% in PV (1: 2). This relationship is significantly different in FB&H, where 100% of ADVLs are in SO, while ADVLs in PO do not exist. At the B&H level, the ratio of state to private ownership, is 2: 1. Based on these data it can be concluded that in FB&H, laboratory tests of public interest for animal health, and consequently human health, are carried out exclusively in ADVLs in SO. By contrast, the RS, apart from its own (state-owned laboratories) very important laboratory capacities, relies mostly on privately-owned laboratories.

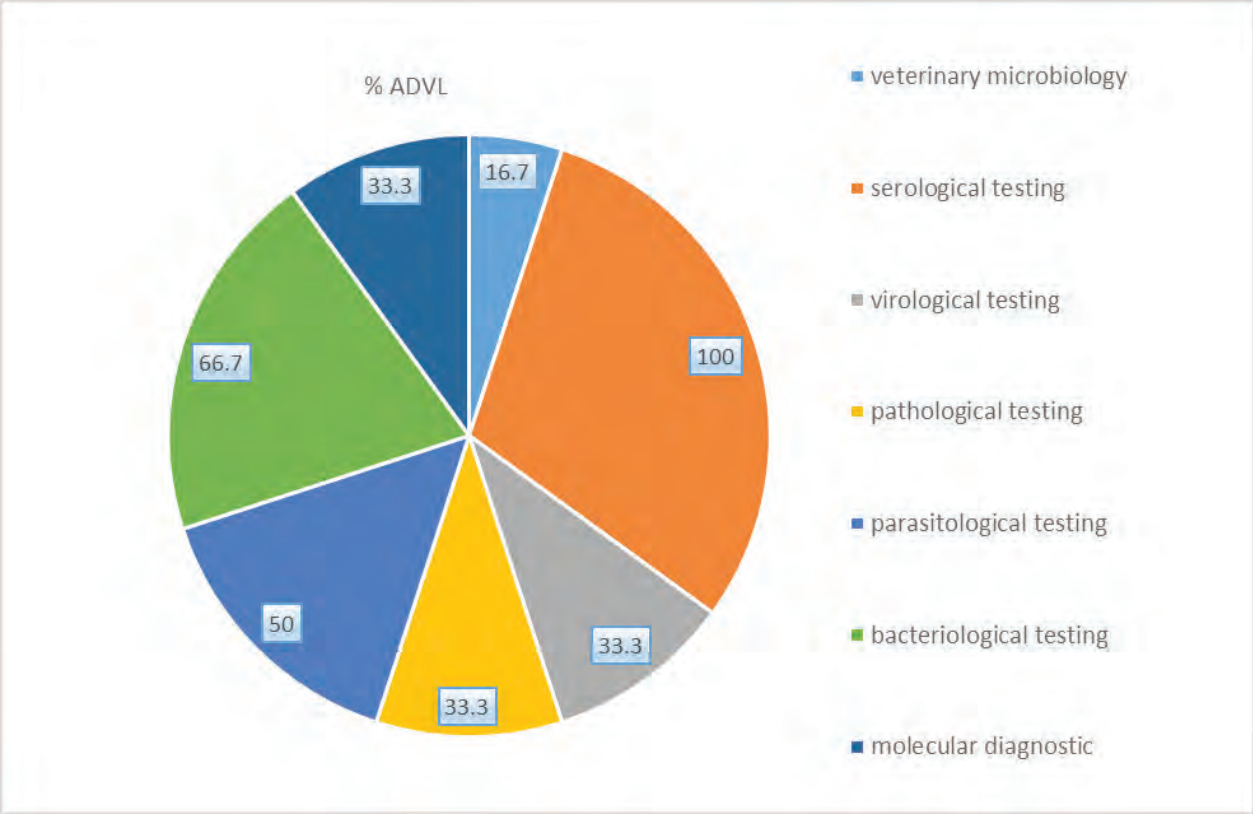
Graph 2 shows the participation of ADVLs in B&H by entities in relation to ownership.



Graph 2. Participation of ADVLs in B&H entities according to ownership

Of the total number of ADVLs in SO in B&H, 25% of them are in the RS, and 75% of them are in the FB&H (1: 3). There are two privately-owned ADVLs in the RS, and none of them in the FB&H. One ADVL in SO in the RS accredited the methods in two locations (2), which practically means that they are two spatially separate laboratories. Taking this into account, this significantly changes the ratio between ADVLs and it is RS: FB&H = 1: 1.5.

Graph 3. shows the representation of ADVLs in B&H in relation to the fields of accreditation.



Graph 3. Representation of ADVLs in B&H in relation to the fields of accreditation

When it comes to different fields of veterinary diagnostic testing, B&H has capacities in the form of ADVL to respond to these requirements, and especially significant capacities are those for serological (100% accredited laboratories), bacteriological (66.70% of accredited laboratories) and parasitological tests (50 % of accredited laboratories). When it comes to serological, virological, pathological and molecular diagnostic tests in veterinary healthcare, the ratio of laboratories in the RS to those in the FB&H is equal , 1: 1. However, virological, pathological and molecular diagnostic tests were accredited by one laboratory from both entities (2, 6), while serological tests were accredited by all laboratories. In FB&H all laboratories also accredited bacteriological tests in veterinary healthcare, and the ratio to accredited laboratories in the RS is 3: 1. Bearing in mind the fact that one RS laboratory accredited these tests under another subfield of accreditation, veterinary microbiology (4), this ratio in real terms is 1.5: 1. The ratio of laboratories performing parasitological tests in veterinary healthcare in the RS and the FB&H is 1: 2. Observing the fields of accreditation, it is immediately noticed that all laboratories accredited serological testing in veterinary healthcare. This

is expected as these tests are the most profitable ones. In addition to this, they are the most common ones, they include a large number of tests (monitoring, milk carton, vaccine control), the methods are standard (OIE Manual), they have a short duration of testing (most often from a few hours to one or two days), the smallest investment is required (equipment, space, supplies, quality control), diagnostics are affordable, complete, allow large number of tests with "puliranje" technique. On the other hand, these tests, apart from a small number of methods, ie testing techniques and tested parameters, are orientational -"screening". This means that in most cases, in order to obtain a final result, each positive result obtained by serological testing, must be confirmed or tested by confirmatory methods. Contrary to serological tests or screening methods, virological and molecular diagnostic tests with confirmatory methods are very little represented as accreditation fields in labs. This is also expected as these tests are very demanding in terms of resources. Requirements for space are extensive, highly trained and experienced staff is needed as well as sophisticated and very expensive laboratory equipment, expensive diagnostics (often not included in the kit, consisting of several components) and quality control is also demanding. Duration of the test procedure is not critical, as it usually takes, as with serological tests, from several hours to one, two, and sometimes more days. On the other hand, requests for these testings are very rare. This actually means that virological and molecular diagnostic tests in the veterinary field are generally not profitable, since the gains from the performed laboratory tests can not cover the costs of investment in the necessary resources and the cost of maintaining laboratory capacity. These tests, therefore, in all laboratories which carry out these tests, exist at the expense of other fields of examination (mainly serological). Also, pathological testing in veterinary healthcare is very limited in both routine work and in the field of accreditation. The reason for this is that there are a very small number of requests for this type of testing, while these tests are not too demanding in terms of resources. Pathology tests in veterinary healthcare were accredited by one laboratory in the RS (2) and one in the FB&H (6), related tests were accredited in these laboratories, ie, diagnosis of the same disease, but using different test methods, TSE diagnostic method Priostrip and EIA.

With regard to these tests, and to other tests, we believe that the subfields of accreditation within the technical field "tests in veterinary healthcare" are not well defined, as different criteria have been used (a group of pathogens - bacteria and viruses, field of testing - pathology and parasitology; testing techniques depending on the type of sample - serology etc.). First of all, we consider that the term "veterinary healthcare" is inadequate because this term does not generally exist in

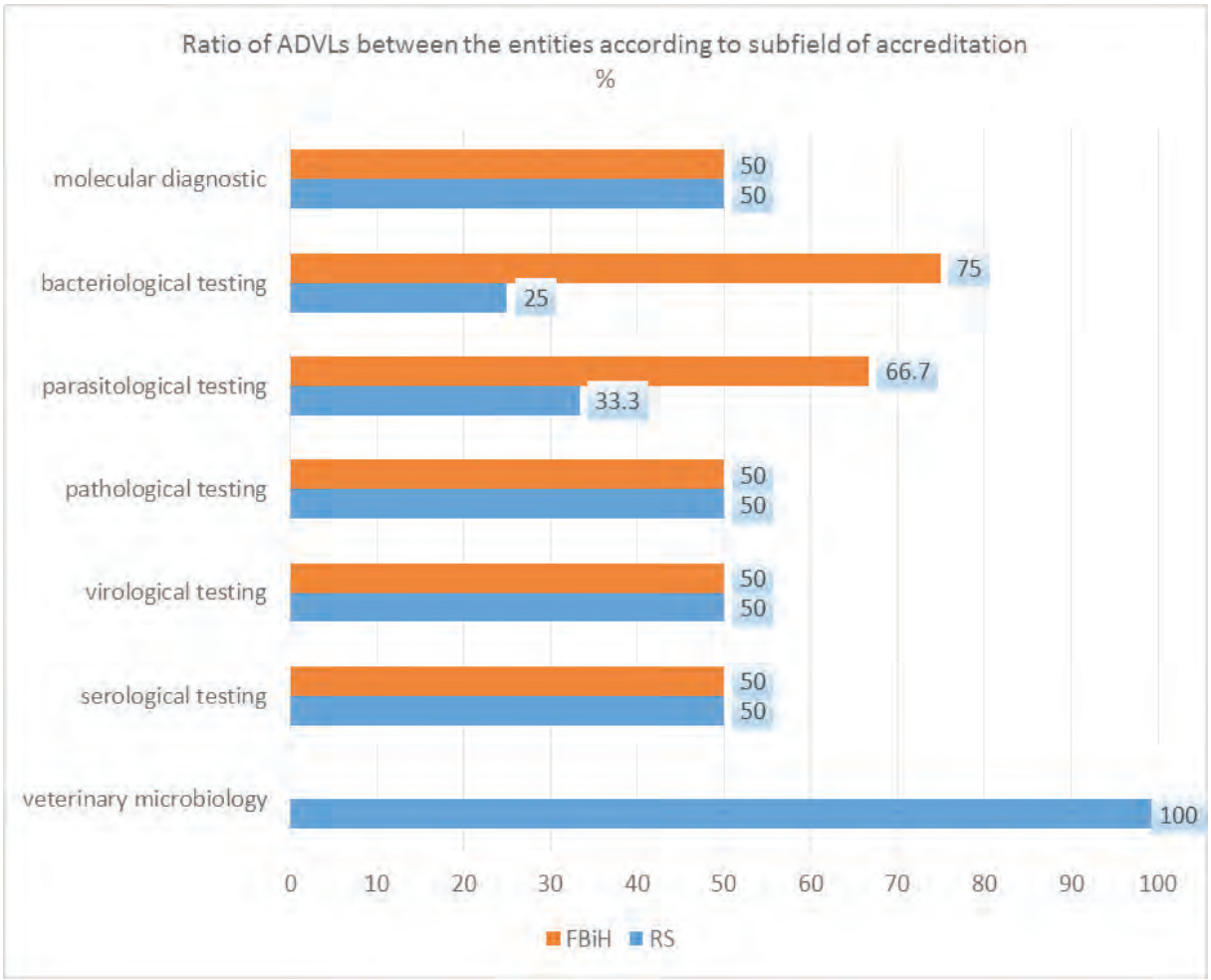
professional terminology when it comes to veterinary medicine. The term used in the professional and scientific public, relating to veterinary activity, is "veterinary medicine", and we suggest that , in accordance with this, the name of this technical field should be changed to "tests in veterinary medicine", which would include all tests in the field of veterinary medicine. Within the technical field of testing in veterinary healtcare, currently there are the following technical subfields: "serology", "virology", "histology", "pathology", "parasitology", "bacteriology" and "diagnostic tests", and within the technical field "molecular biology testing" there is another subfield entitled "molecular diagnostics in veterinary healthcare" (16). TSE Diagnostics is classified into "pathological testing in veterinary healthcare" subfield, primarily on the basis of the internal organization of an ADVL (2, 6) although these tests have little to do with these tests, taking into account the test techniques (Priostrip, EIA) which are based on immune reactions. In this case, neither the causative agent nor the testing technique was taken as a factor which define the technical subfield, but the fact that these tests in veterinary diagnostic laboratories were first implemented in pathological testing laboratories. It should also be noted that technical subfield "molecular diagnostics in veterinary healthcare" was not classified by BATA into the technical field " testing in veterinary healthcare", but in the technical field "molecular biology testing" (16). Test methods from this technical subfield were accredited by two ADVLs (2, 6) Also, when it comes to virological testing in veterinary medicine, there is an example when, on the basis of the tested parameter, ELISA and IHA tests were added (6), while in all other ADVLs, the ELISA test was classified into the technical subfield "serological tests in veterinary healthcare "(2-5, 7) There is a similar situation with testing of Salmonella spp parameter in faeces and swabs, with one ADVL from the RS accrediting this method in the subfield "bacteriological testing in veterinary healthcare" (2), and another ADVL accredited this same method in the subfield "veterinary microbiology" (3), while all three ADVLs in the FB&H accredited this method in the subfield "bacteriological tests in veterinary healthcare" (5-7). It should aslo be noted that the term veterinary microbiology as a field of accreditation is not clear, it is confusing and it is wrong in this context. The term veterinary microbiology in a narrow sense, slang, refers to bacteriological testing, while in a broader sense it include bacteriology, virology and mycology, that is, it refers to a very wide field in veterinary medicine. Also, serology is covered by this wider meaning, but not as a real field of microbiology, but rather as a field of examination that involves testing techniques based on one type of sample, i.e. blood serum (serum serology), and which, directly or indirectly, demonstrate the presence of bacteria, viruses and

parasites. Regarding the term "serological testing in veterinary helthcare", as well as "pathological ", we consider it to be formed on the basis of the internal organization of the diagnostic veterinary laboratories (2,6), rather than on the basis of a real professional analysis and evaluation. It is also not clear what is meant by subfield '' diagnostic testing'' (16) whether it is a clinical test involving work with patients ,that is live animals, whether they are tests derived from a particular case, during the clinical examination of an animal with the aim of diagnosing or whether they are other laboratory tests that can not be classified in any of the subfields. We consider this term to be inappropriate because it is general, indefinite and may refer to all other testings or technical subfields in the field of "testing in veterinary healthcare". Generally, term diagnosis means defining the cause of diseases and is based on anamnestic data, clinical examination and laboratory analysis. The subfield "pathological testing" is also questionable in terms of the name for two reasons. Firstly, it is not clear what this kind of tests should refer to, apart from necropsy of an animal. Secondly, diagnosis of prion is exclusively included in this subfield, irrelevant to the test method or test technique. If it is assumed that all causative agents of animal disease cause certain pathological changes, then, according to that logic, each examination could be classified as pathological. So in that case, in the above mentioned methods, it is not about determining pathological changes, but about determining the presence of the causitive agent, as in, for example, serological, parasitological, bacteriological and other tests. Pathological changes are determined exclusively by macroscopic (naked eye, autopsy) and microscopically (by preparing and inspecting histological and pathohistological sections). This calls into question future accreditation of certain types of tests (immunoenzymatic, immunological, mycological), as well as some tests which are already accredited (ELISA test, prion diseases, etc.). This, on the one hand, indicates the inadequacy of BATA documents in terms of technical fields and subfields of accreditation related to veterinary medicine tests, and, on the other hand, the inconsistency of technical experts, evaluators and leading BATA assessors, ie non-compliance with the same principle . Finally, BATA did not define the criteria by which accredited test methods would be classified into the appropriate technical fields and subfields. In general, we believe that BATA document that defines technical fields and subfields in veterinary medicine needs revision in terms of the adequacy of their names. In the first place, it is necessary to determine the approach, ie what will be the parameters for the classification of technical subfields ,whether they will be based on the examined parameter, field of examination, matrix (sample type) or testing techniques. We think that the internal organization of ADVL should be

neglected in this regard, since all ADVLs are organized differently. Once a technical subfield is formed, double standards or approaches should be avoided when assigning test methods to it. It should be noted that bacteriological, mycological and virological tests are included in microbiological tests, and cannot simultaneously exist as subfields. Bacteriological, mycological, virological, prion and parasitological tests can be carried out individually with different test techniques (ELISA, AGID, Rose Bengal, PCR, Real Time PCR, EIA, ELFA, etc.). If the matrix is a factor that defines a technical subfields, the name of the serological testing should be carefully chosen because serological tests involve blood serum as a matrix and many of the test methods, in addition to blood serum use blood plasma, full blood, milk or milk serum. The ELISA method, as a typical representative of the "serological testing", can directly(antigen) and indirectly (antibodies) prove bacterial, viral, prion and parasitic diseases, regardless of the matrix (sample types). These problems and examples were already pointed out on harmonization meetings in 2016, however, BATA explanation is that it currently does not have enough resources and that it is necessary to activate external associates for the purpose of comprehensive analysis and discussion on this issue. Since BATA has several technical experts in veterinary medicine who actively participate as technical experts and evaluators in the procedure of accreditation of diagnostic veterinary laboratories, the attitude of BATA on this issue is not sustainable, as it already uses their expertise. All this points to the necessity for other ADVLs to take the initiative and take part in the adjustment and clear definition of technical fields and subfields in veterinary medicine, in order to harmonize them and come up with a uniform approach for their accreditation. Taking all this into account as well as knowledge in the field of veterinary medicine, we think that the technical subfields should be formed according to broader areas and their particular specificities, and we propose the following technical subfields of testing: parasitological, molecular, immunological, pathological-histological and biochemical diagnostics together with isolation and identification of microorganisms. The subfields of parasitological diagnostics would include test methods based solely on macroscopic and microscopic identification of parasites. The subfield of molecular diagnostics would include test methods, independent of PCR techniques, which demonstrate the presence of the genome of microorganisms and parasites. The subfield of immunological diagnostics would include all test methods based on immunological reactions, independently of the cause, directly or indirectly proven. The field of pathological and histological diagnostics would include, on the one hand, pathomorphological diagnostics, and, on the other hand, test methods based on the preparation and examination of histological and pathohistological sections. The subfield

of biochemical diagnosis would include test methods that determine biochemical parameters in tissues, body fluids, secretions and excreta.

Graph 4 shows the ratio of ADVLs between the entities according to subfields of accreditation.



Graph 4 . The ratio of ALHs in the entities according to the field of accreditation

Of seven accredited subfields of testing in B&H, laboratories in the RS accredited all seven (100%) and in the FB&H six subfields were accredited (85.70%). In the FB&H, tests in all accredited subfields are performed exclusively in state-owned laboratories. In the RS, this is the case in virological, molecular diagnostics, parasitological and bacteriological tests. Laboratories in private ownership exclusively carry out tests in the field of veterinary microbiology, while in the subfield of serological testing the ratio 1: 2 is in

favor of privately.owned laboratories. At the B&H level, virological, molecular diagnostics, pathological, parasitological and bacteriological tests are performed exclusively in laboratories in SO, in the subfield of veterinary microbiology tests are performed exclusively in laboratories in PO, while in the subfield of serological testing, tests are performed mostly in laboratories in SO (2: 1).

Table 3 shows the percentage of ADVL in SO and PO in B&H according to the subfield of accreditation.

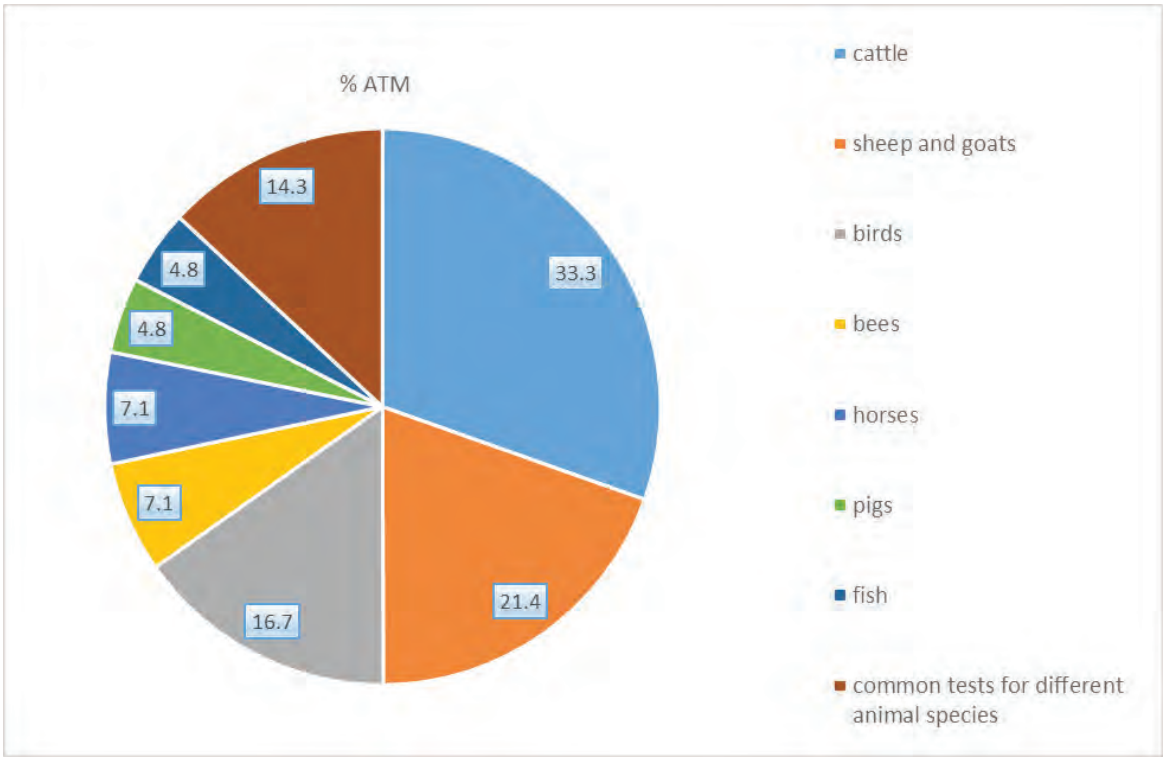
Field of accreditation	%					
	RS		FB&H		B&H	
	SO	PO	SO	PO	SO	PO
LI 3.6 Veterinary microbiology	0	100	0	0	0	100
LI 4.1 Serological testing	33,30	66,70	100	0	66,70	33,30
LI 4.2 Virological testing	100	0	100	0	100	0
LI 4.5 Pathological testing	100	0	100	0	100	0
LI 4.6 Parasitological testing	100	0	100	0	100	0
LI 4.7 Bacteriological testing	100	0	100	0	100	0
LI 19.2 Molecular diagnostis	100	0	100	0	100	0

At the B&H level, state-owned laboratories accredited 6 subfields (85.70%), while privately-owned laboratories accredited 2 subfields (28.60%). Of the total number of accredited subfields in the RS, state-owned laboratories dominate in 71.40% of subfields,the same ratio of laboratories is in 14.30% of subfields, while privately. owned laboratories are dominant in 14.30% of subfields. Privately-owned laboratories dominate in the field of serological testing, which is expected, given the characteristics of these tests, profitability in the first place , which is also the main reason for the existence of private labs. In FB&H all diagnostic tests in veterinary medicine are performed by state-owned laboratories (100%). At the B&H level, laboratories in state ownership are dominant in 85.70% of the fields, while privately-owned laboratories are dominant in 14.30% of the fields. By analyzing accredited subfields of accreditation, it is noted that laboratories in state ownership accredited methods in most of the subfields, while laboratories in private ownership have mostly selected subfields that are the least or less demanding from the standpoint of accreditation (serological testing) and those which make a higher profit because the requirements for these analyzes are more frequent (regulations, tests of a larger number of samples, etc.). In addition to this it should be noted that the methodology of work and equipment is simpler and

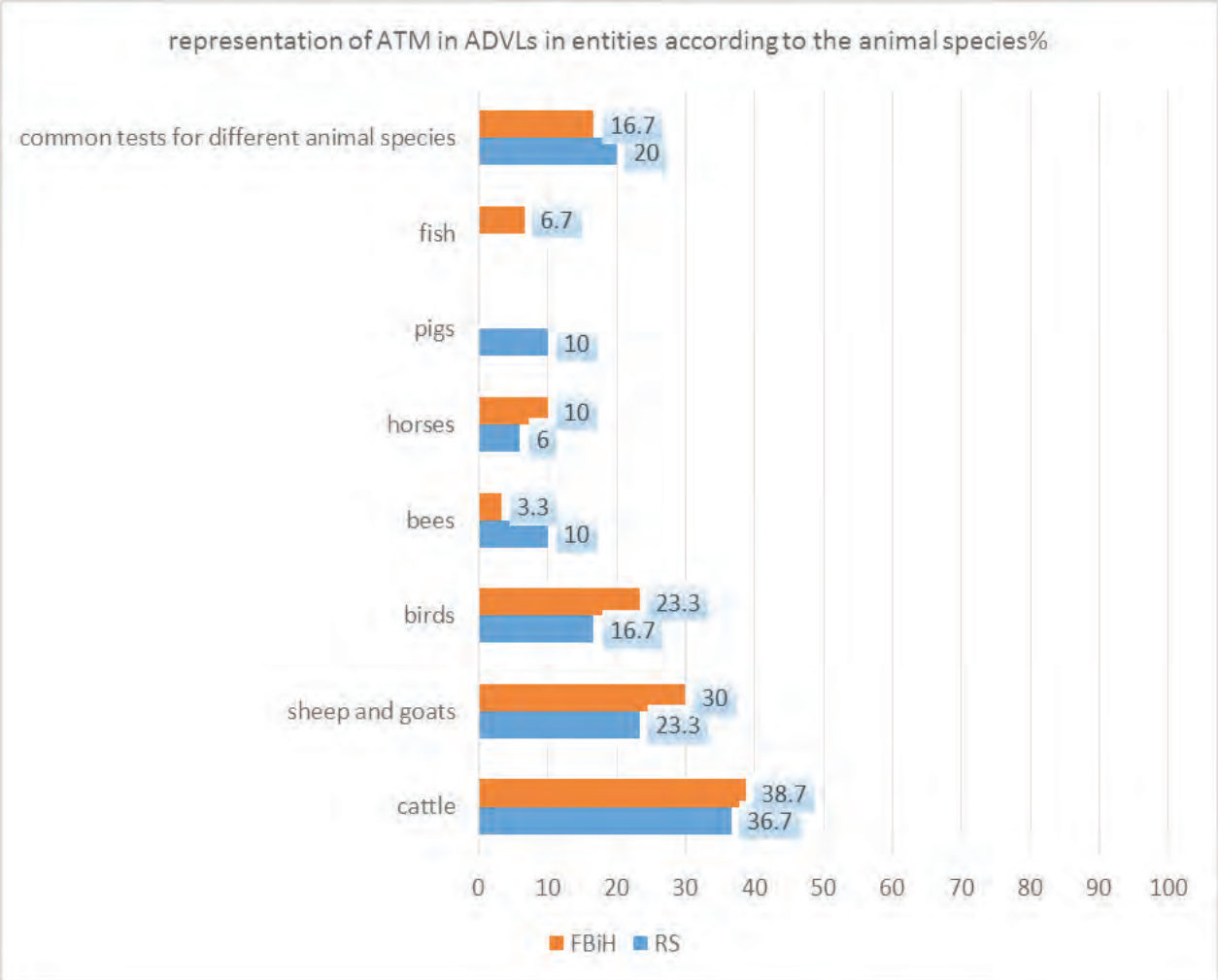
applicable to all methods from these accredited subfields. The methods are very quickly and easily introduced into routine work, the tests take very little time, results are fast, standard methods without validation requests and with very simplified verification and measurement uncertainty. Also consumables, reagents and diagnostic kits are ready to be used without prior preparation. This is understandable since the basic reason for the existence of private laboratories is gaining profit and, accordingly a free and targeted selection of fields requiring work authorizations by the competent authorities, and then the accredited fields.

41 different test methods were accredited in the diagnostic testing veterinary laboratories in B&H. Out of this, in the RS, 30 (73.20%), different test methods were accredited in the RS, while 31 methods (75.60%) are accredited in the FB&H.

Graphs 5. and 6. show the representation of accredited test methods (ATM) in ADVLs in B&H according to the animal species.



Graph 5. Representation of accredited test methods in ADVLs in B&H according to the animal species



Graph 6. Representation of accredited test methods in ADVLs in the entities according to the animal species

Compared to the total number of AIMs, according to the type of animal, most of the test methods were accredited for the diagnosis of cattle diseases (33.30%), sheep and goats (21.40%) and birds (16.70%) as well as common tests for several species of animals (14.30%). The ratio of AIM to ADVL between the entities according to the animal species (cattle, sheep and goats, birds, horses, common tests for several species of animals) is approximate, for fish it is 2: 1 in favor of the FB&H and for pigs it is 1,5: 1 in favor of the RS.

CONCLUSION

Based on the obtained results, the following conclusions are drawn:

1. In Bosnia and Herzegovina, 6 test diagnostic veterinary laboratories were accredited, three in the RS (50%) and three in the FB&H (50%).
2. Of the total number of accredited diagnostic testing veterinary laboratories in Rebublika Srpska, 33.30% of them are state-owned and 66.70% are privately- owned, in the Federation of B&H 100% of laboratories are state-owned, while at B&H level 66, 70% are state-owned, and 33.30% of them are privately owned ones. In the Federation of Bosnia and Herzegovina, the activities of laboratory testing of public interest for animal health and, consequently, human health, are carried out exclusively in accredited state-owned diagnostic veterinary laboratories, and Republika Srpska, in addition to its own (state-owned) laboratory capacity, relies mostly on privately- owned laboratories.
3. Diagnostic testing veterinary laboratories in Bosnia and Herzegovina accredited 7 different accreditation subfields related to the diagnosis of animal diseases, out of which 7 (100%) in Republika Srpska and 6 (85.70%) in the FB&H. At the B&H level, state-owned laboratories are dominant in 85.70% of the fields, and privately-owned ones dominate in 14.30% of the subfields. Of the total number of accredited subfields in the RS, state-owned laboratories dominate in 71.40% of the subfields,the same ratio of laboratories is in 14.30% of the subfields, while privately-owned laboratories are dominant in 14.30% of the subfields. In FB&H all diagnostic veterinary tests are conducted by state-owned laboratories (100%). State-owned laboratories accredited test methods in 6 subfields (85.70%) and privately- owned ones in 2 subfields (28.60%). All laboratories accredited serological tests. Privately-owned laboratories have chosen exclusively those subfields which bring higher profits, for example, (serological tests), because the requirements for these analyzes are more frequent, and the methodology of work and equipment is simpler. Virological tests, molecular diagnostics, pathological, parasitological and bacteriological tests in B&H are all performed exclusively in state-owned laboratories.
4. B&H has significant capacities of accredited test diagnostic veterinary laboratories, especially for serological (100% accredited laboratories), bacteriological (66.70% of accredited laboratories) and parasitological testing (50% of accredited laboratories).
5. In 41 diagnostic veterinary laboratories in B&H, 41 different

test methods were accredited. Of these, 30 different test methods were accredited in the Republika Srpska (73.20%), and 31 methods(75.60%) in the FB&H. Compared to the total number of accredited test methods, according to the type of animal, most of the test methods were accredited for the diagnosis of cattle diseases (33.30%), sheep and goats (21.40%) and birds (16.70%) as well common test for several species of animals (14.30%).

6. The names of the technical fields and subfields related to veterinary medicine are not adequately defined by the BATA (Accreditation Institute) (BATA) and are mutually opposing or have no professional and scientific base. BATA has no defined criteria nor a harmonized approach when classifying accredited test methods into appropriate technical fields and subfields in veterinary medicine, which are an integral part of Annex to Accreditation Certificate of accredited test laboratories. The name of the technical field "testing in veterinary healthcare" should be changed to "testing in veterinary medicine", and subfields in veterinary medicine should be formed according to the wider areas and their specificities, and we propose the following technical testing subfields: parasitological, molecular, immunological, pathohistological and biochemical diagnostics, as well as isolation and identification of microorganisms.

REFERENCES

1. BAS EN ISO/IEC 17025. 2006. General requirements for the competence of testing and calibration laboratories. Institute for standardization of B&H. 2. izdanje.
2. Addendum to accreditation no. LI-41-01. 2018. Institute for accreditation of B&H. Revizija 0 od 04.01.2018.
3. Addendum to accreditation no. LI-49-01. 2018. Institute for accreditation of B&H. Revizija 1 od 02.02.2018.
4. Addendum to accreditation no. LI-50-01. 2017. Institute for accreditation of B&H. Revizija 0 od 22.02.2017.
5. Addendum to accreditation no. LI-24-01. 2017. Institute for accreditation of B&H. Revizija 0 od 06.06.2017.

6. Addendum to accreditation no. LI-43-01. 2018. Institute for accreditation of B&H. Revizija 0 od 12.01.2018.
7. Addendum to accreditation no. LI-61-01. 2017. Institute for accreditation of B&H. Revizija 0 od 03.04.2017.
8. Zakon o akreditovanju Bosne i Hercegovine. 2001. Službeni glasnik BiH. Broj 19.
9. Zakon o veterinarstvu. 2000. Službene novine Federacije BiH. Broj 46.
10. Zakon o veterinarstvu u Bosni i Hercegovini. 2002. Službeni glasnik BiH. Broj 34.
11. Zakon o veterinarstvu u Republici Srpskoj. 2017. Službeni glasnik BiH. Broj 75.
12. Zakon o osnivanju Instituta za akreditovanje Bosne i Hercegovine. 2002. Službeni glasnik BiH. Broj 10.
13. Odluka o uslovima koje moraju ispunjavati ovlaštene veterinarske dijagnostičke laboratorije. 2004. Službeni glasnik BiH. Broj 25.
14. Odluka o izmjenama i dopunama odluke o uslovima koje moraju ispunjavati ovlaštene veterinarske dijagnostičke laboratorije. 2009. Službeni glasnik BiH. Broj 43.
15. Sistem akreditovanja Bosne i Hercegovine. 2017. Institute for accreditation of B&H. PD 05-01. Izdanje 31.
16. Tehnička područja i podpodručja rada Instituta za akreditovanje Bosne i Hercegovine. OD 07-40 od 11.12.2017.
17. http://www.bata.gov.ba/Akreditirana_tijela/Spisak-akreditiranih-tijela.pdf (02.02.2018.)

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