

Akademija nauka i umjetnosti Bosne i Hercegovine
Academy of Sciences and Arts of Bosnia and Herzegovina
Naučno-stručni skup sa međunarodnim sudjelovanjem
“UPRAVLJANJE ANIMALNIM OTPADOM I ODRŽIVI RAZVOJ”
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“MANAGEMENT OF ANIMAL WASTE AND SUSTAINABLE DEVELOPMENT”

ZAKLJUČCI I PREPORUKE

CONCLUSIONS AND RECOMMENDATIONS

Priredio/By Sulejman REDŽIĆ

Akademija nauka i umjetnosti Bosne i Hercegovine (ANUBiH) u saradnji sa firmom Grizelj, d.d. Sarajevo organizirala je Naučno-stručni skup: *“Upravljanje animalnim otpadom i održivi razvoj”*, 27. 06. 2011. u Sarajevu. Skup je studiozno pripreman kroz ekspertsko djelovanje institucija i pojedinaca iz zemlje i inostranstva u koordinaciji ANUBiH. Osnovna misija i ciljevi Skupa bili su: (i) Procjena aktuelnog stanja animalnog otpada u BiH i dosadašnjih oblika upravljanja; (ii) Identifikacija “vrućih tačaka” u odnosu na animalni otpad u BiH sa kartografskom interpretacijom, upotrebom GIS-a; (iii) Zdravstveno-veterinarski i ekološki-humana

evaluacija animalnog otpada u BiH; (iv) Tehničko-tehnološka rješenja u upravljanju animalnim otpadom; (v) Organizacija prikupljanja i deponovanja animalnog otpada na regionalnom, entitetskom i državnom nivou; (vi) Zakonodavna rješenja u postizanju održivosti upravljanja animalnim otpadom; (vii) Ekonomsko-ekološki aspekti ("cost-benefit" analiza optimalnog upravljanja animalnim otpadom).

Na Konferenciji je prezentirano 16 referata iz ključnih oblasti upravljanja animalnim otpadom, od strane 30 autora i koautora iz zemlje i inostranstva. Nakon prezentiranih referata i konstruktivne rasprave, utvrđeno je sljedeće:

(1) Otpad predstavlja jedan od najsloženijih ekoloških i okolinskih problema današnjice. I u Bosni i Hercegovini to je najozbiljnije ekološko pitanje. Animalni otpad veoma opterećuje sve sfere života i značajno utiče na narušavanje slike ekosfere. Ozbiljnost ovih pitanja nameću potrebu razvoja održivog upravljanja otpadom, sa posebnim osvrtom na animalni otpad. Iako je bilo pokušaja da se kroz različite projekte optimizira stanje u ovom segmentu bosanskohercegovačkog društva, postignuti rezultati nisu ispunili očekivanja. Zato je neophodno pristupiti izradi projekta na održivim osnovama koji će pružiti potrebna efikasna rješenja u ekološkom, energetskom, tehničko-tehnološkom, zdravstveno-veterinarskom, humanom i zakonodavno-ekonomskom sektoru. Uz to, održivo upravljanje animalnim otpadom je u neposrednoj vezi sa proizvodnjom certificirane hrane, ekologizacijom stočarstva i prehrambene industrije u najširem smislu i ispunjavanjem okolinskih obaveza države Bosne i Hercegovine na putu ka Evropskoj uniji.

(2) Animalni otpad ekološki je veoma reaktivan. Nezbrinut animalni otpad uvjetuje vrlo ozbiljne okolinske probleme u svim sferama života: hidrosferi, pedosferi, atmosferi i geosferi. Eksperimentalno je dokazano da animalni otpad uvjetuje zagađenje, toksifikaciju, infekciju, narušava vizualnu sliku ekoloških pejzaža, te uvjetuje emisiju neugodnog mirisa, amonijskih tvari, karbonskih plinovitih jedinjenja i drugih okolinski reaktivnih produkata dekompozicije organskih ostataka životinja.

(3) Animalni otpad je u najneposrednijoj vezi sa intenzivnim procesima eutrofikacije površinskih i podzemnih voda. Proces eutrofikacije rezultira biosintezom toksina što uvjetuje stanje toksinifikacije, zatrovanosti vode produktima metabolizma patogenih mikroorganizama (*Cryptosporidium parvum*, *Giardia* spp.; *Listeria monocytogenes*, *Escherichia coli* O157:H7,

Salmonella spp., i *Mycobacterium paratuberculosis*, *Brucellae*, *Bacillus anthracis*, te različiti enterovirusi: *poliovirus*, *coxsackie virus*, *echovirus*, *hepatitis A*, *rotavirus* i dr.).

(4) Zbrinjavanje uginulih životinja i strvina usljed prirodne smrti kao i u slučaju pojave bolesti zarazne/infektivne i epidemije mora biti na veterinarski-zdravstveno i ekološki ispravan način, uz sprečavanje kontaminacije tla, vode i zraka.

(5) Animalni otpad ozbiljno se dovodi u vezu sa uznemirenošću lokalnog stanovništva, ugroženošću svijeta divljine, te sa općom okolinskom sigurnošću. Uz biološko-okolinske efekte, animalni otpad utiče na zdravstvenu sigurnost, otvara mnoga društvena, ekonomska, pa i politička pitanja. Animalni otpad u mnogim sredinama u BiH je i snažan instrument u profiliranju političkih utjecaja i upravljanja općom sigurnosti.

(6) Otpad se treba tretirati kao repromaterijal širokog spektra u generiranju efikasne i održive dobiti. To je i konkretan doprinos elementarnom principu prevencije zagađenja u kontekstu savremenog koncepta održivog razvoja. Uz sve vrste otpada animalni otpad (klaonički konfiskati, uginule životinje i kućni ljubimci, ekskrementi i slični metaboliti životinja) je sirovina za dobijanje energije i širokog spektra proizvoda (stočne hrane, fertilizatora, novih materijala i sl.). Animalnom otpadu u bilo kojem obliku nije mjesto na deponiji ili nekontroliranim odlagalištima iz različitih ekološko-zdravstvenih i društveno-ekonomskih, pa i političkih razloga. Animalni otpad se već dugi niz godina u BiH ekološki, veterinarski i zdravstveno zbrinjavao i koristio kao stočna hrana početkom sedamdesetih godina prošlog stoljeća u sistemima SIMENS-a, Agrokomerca, Bimex-a itd. Danas u BiH postoji preko 2500 registriranih meso-prerađivača: u Federaciji Bosne i Hercegovine (FBiH) cca 1400, u Republici Srpskoj (RS) cca 1000 i u Distriktu Brčko (DB) cca 400. Zato je neophodno uspostaviti ranije mehanizme dostignute prakse, te ih unaprijediti sukladno savremenim potrebama i intencijama i kroz razvoj regionalne mreže saniranja animalnog otpada upotrijebiti kao resurs (repromaterijal) u generiranju nove dobiti.

(7) Postojeća zakonska regulativa (zakoni, pravilnici, odluke i slični dokumenti) na svim nivoima društveno-političkog organizovanja moraju se konzistentije primjenjivati uz naglašeniji monitoring i dodatni intervencionizam resornih ministarstava kako bi se osigurala ne samo ekološka sigurnost već i postigli ekonomski efekti. Uz to, treba koristiti iskustva zemalja u regionu koje imaju slične obrasce razvoja, te prirodno-okolinske determinante.

(8) Najprihvatljivija tehničko-tehnološka rješenja u upravljanju animalnim otpadom su spalionice uz adekvatnu ekološko-tehnološku proceduru. Spaljivanje animalnog otpada je rješenje za sigurno zbrinjavanje i uništavanje otpada koji nastaje u bioprodukciji, te u svakodnevnom životu. Stacionarna postrojenja za spaljivanje otpada moraju biti usaglašena sa BAS EN 746-1 A1-2010 (Industrijska oprema za termičku obradu), a zbrinjavanje otpada vršiti prema normama EU No. 1069/2009 i EU No.142/2011 i kao takva instalirati i koristiti kao ekološki, veterinarski-zdravstveno podobna postrojenja za okoliš. Putem spalionica se može zbrinuti čvrsti otpad, humani otpad, tečni kao i gasoviti/plinski otpad. Osnovna korist je 60% – 80% energetske efikasnosti. Višestruki su okolinski i ekonomski efekti ovakvog načina zbrinjavanja animalnog otpada. U svezi sa ovim potrebno je sistemski odabrati subjekte koji raspolažu sa potrebnim kapacitetima na nivou regije, entiteta i države. Jedan od takvih subjekata je i firma Grizelj d.d. Sarajevo koja inače njeguje i ima uveden sistem kontrole kvaliteta EN ISO 9001:2008 i upravljanje okolišom EN ISO 14 001:2009.

(9) Tehničko tehnološko rješenje spalionica, zbrinjava animalni otpad na human način iz kojeg se preko kogeneracije, dvogeneracije i trigeneracije (CHCP) uspostavlja energetski benefit u vidu toplotne, rashladne i električne energije kao i prihvatljivo ekološko rješenje iz kojeg proizilazi emisija polutanata bez boje, okusa i mirisa i ekološki dobar pepeo.

(10) Ekskrementi animalnog porijekla (đubrivo, te krv i srodni metaboliti) trebaju biti tretirani u skladu sa okolinskim principima i načelima održivog razvoja. Svaki subjekat treba raspolagati sa vlastitim sistemima za fitoremedijaciju animalnog otpada prije njegovog uključivanja u bilo koji od segmenata okoliša, a naročito u vodu i tlo. Fitoremedijacija je ekološki podobna i ekonomski efikasna, a društveno racionalna. Neophodna je inventarizacija subjekata, osiguranje konsaltinga, implementacija, te efikasan monitoring. Na ovaj način se mogu ekološki rasteriti zagađene površinske i podzemne vode, te zemljište.

(11) Stajska đubriva upotrebljavati u skladu sa kapacitetom prihvata lokalnog tla u odnosu na nitrata, a naročito fosfate kao kontrolirane fertilizatore u održivoj bioprodukciji. Stajsko đubrivo je izvanredan resurs u dobijanju biogasa koji se uspješno koristi u toplifikaciji i elektrifikaciji. Uspostava biogas-stanica je i doprinos ka smanjenju emisije stakleničkih plinova – obilježje svih članica EU. Na ovaj način BiH može smanjiti postojeće emisije iz konvencionalnih energetskih postrojenja za približno 10%.

(12) Kao poseban prioritet u optimizaciji stanja u sektoru animalnog otpada je inventarizacija i geografsko-topografska determinacija koordinata subjekata koji se bave ovom djelatnošću, te privremenih ili stalnih odlagališta i divljih deponija animalnog otpada, uključujući i lokalitete na kojima je vršena ili se i dalje vrši eutanazija uginulih životinja. Naročit prioritet ima krško područje BiH kao ekološki najranjiviji prostor. Nakon kartografske identifikacije pristupiti programima održivog zbrinjavanja organskih ostataka i sanaciji ranijih odlagališta u skladu sa principima ekološke restauracije.

(13) Izvršiti identifikaciju prostorno-ekološki i društveno-ekonomski najprihvatljivijih lokacija za uspostavu uredene lokacije za adekvatno skupljanje, čuvanje i zbrinjavanje animalnog otpada uvezane u mrežu producenata animalnog otpada, te u sisteme za njegovo spaljivanje i recikliranje do postizanja ekološke i ekonomsko-energetske održive dobiti. U svim fazama realizacije neophodne su studije procjene uticaja na okoliš, „*cost benefit*“ analiza, kontingentna analiza i drugi instrumenti kompatibilni misiji održivog razvoja i sigurnog življenja.

(14) Izvršiti reviziju raspoloživih dokumenata (strategije, programi, uredbe) koji tretiraju upravljanje animalnim otpadom na svim nivoima društveno-političkog organizovanja (općine, kantoni/županije, entiteti) u skladu sa realnim potrebama i stvarnim stanjem na terenu.

(15) Nastaviti u kontinuitetu praćenja novih tehničkih i tehnoloških tehnika u oblasti upravljanja animalnim otpadom kao i zakonske regulative.

(16) Nastaviti suradnju Akademije nauka i umjetnosti BiH sa vladinim sektorima i naučno-obrazovnim institucijama, domaćim i međunarodnim institucijama kao i privrednim subjektima koji će implementirati projekat, radi zaštite životne sredine (prirode i okoliša), osiguranje stimulativnih i povoljnih kreditnih sredstava od IPA fonda, EBRD, Svjetske banke za realizaciju Projekta Upravljanje animalnim otpadom i održivi razvoj.

(17) Za postizanje potrebne održivosti u upravljanju animalnim otpadom kao i animalnim sektorom u cijelosti, neophodna je sistemska ekologizacija, postojanje političke opredijeljenosti na lokalnom, regionalnom i nacionalnom nivou, temeljita primjena pristupa “PP” (“*prevention pollution*” – prevencija zagađenja), znanje i procjena tržišne održivosti. Kao instrument u postizanju ove misije je izrada naučno-stručnog projekta sa sljedećim strukturno-funkcionalnim cjelinama: (i) Stanje u Sektoru, (ii)

Ekološko-okolinski aspekti, (iii) Zdravsteno-ekološki aspekti, (iv) Tehničko-tehnološka rješenja (v) Društveni aspekti, (vi) Ekonomska analiza i (vii) Političke refleksije. Kao *Center of Excellence* u realizaciji ovog projekta je Akademija nauka i umjetnosti BiH u saradnji sa ciljanim privrednim subjektima, te drugim referentnim institucijama i pojedincima.

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„MANAGEMENT OF ANIMAL WASTE AND SUSTAINABLE DEVELOPMENT“

CONCLUSIONS AND RECOMMENDATIONS

By Sulejman REDŽIĆ

The Academy of Sciences and Arts of Bosnia and Herzegovina (ASABH) in cooperation with the company Grizelj d.d. Sarajevo organized a Scientific-professional Conference: "*Management of animal waste and sustainable development*", 27. 06. 2011. The Conference is seriously prepared by expert institutions and individual scientists from home and abroad in coordination of ASABH. The basic mission and goals of the Conference were: (i) The current state assessment of animal waste in Bosnia and Herzegovina (BH) and the current form of governance, (ii) Identification of "hot spots" in relation to animal waste in BH with the cartographic interpretation, the use of GIS, (iii) Health, veterinary and environmental evaluation of human-animal waste in BH, (iv) Technical and technological solutions in the management of animal waste, (v) The organization of collection and disposal of animal waste on a regional, entity and state levels, (vi) The legislative

solutions to achieve sustainable animal waste management, (vii) Economic and ecological aspects ("cost-benefit" analysis of the optimal management of animal waste).

At the Conference were presented 16 papers in key areas of management of animal waste by 30 authors and co-authors from the country and region. After the paper presentations and constructive discussion have been found follows:

(1) Waste is one of the most complex ecological and environmental problems of today. In BH, this is the most serious environmental issue. Animal waste is a burden all spheres of life and significantly influences the image distortion of the ecosphere. The seriousness of these issues necessitate the development of sustainable waste management, with special emphasis on animal waste. Although there were attempts to optimize the various projects in the state of this segment of the Bosnian-Herzegovinian society, the results obtained did not meet expectations. It is therefore necessary to draw up a project on a sustainable basis that will provide effective solutions needed in the environmental, energy, technical, technological, medical, veterinarian, humane and legislative-economic sector. In addition, the sustainable management of animal waste is directly connected with the production of certified food, greening livestock and food industry in the broadest sense, and filling out the environmental obligations of BH on its intentions towards the European Union.

(2) Animal waste is environmentally very reactive. Neglected animal waste causes serious environmental problems in all spheres of life: the hydrosphere, pedosphere, atmosphere and geosphere. Experiments have shown that animal waste causes pollution, toxification, infection, visual tactile distorts the image of ecological landscape, causing the emission of odor, ammonia compounds, gaseous carbon compounds and other environmental reactive decomposition of organic animal waste;

(3) Animal waste is in close in connection with the intensive process of eutrophication of surface and groundwater. The process of eutrophication is results in biosynthesis of toxins which causes the condition toxinifications, poisoned water metabolic products of pathogenic microorganisms (*Cryptosporidium parvum*, *Giardia* sp., *Listeria monocytogenes*, *Escherichia coli* O157: H7, *Salmonella*, and *Mycobacterium paratuberculosis*, *Brucellae*, *Bacillus anthrax*, and the different enteroviruses: *poliovirus*, *Coxsackie virus*, *echovirus*, *hepatitis A*, *rotavirus*, etc.).

(4) Disposal of dead animals and carrion due to natural death, as in the case of infectious diseases / epidemics of infectious and veterinary – health and environmentally sound manner, to prevent contamination of soil, water and air.

(5) Animal waste causes serious anxiety in connection with the local population, vulnerability of the wild, and with general environmental safety. In addition of environmental and biological effects, animal waste affects health security, raises many social, economic and even political issues. Animal waste in many communities in BiH is a powerful instrument in the profiling of political influence and to maintain public safety.

(6) Waste should be treated as components of a wide spectrum of generation of efficient and sustainable profits. It is a concrete contribution to the elementary principles of pollution prevention in the context of the modern concept of sustainable development. With all types of waste animal waste (slaughterhouse confiscates, dead animals and pets, and the excrement of animals similar metabolites) is a raw material for energy and a wide range of products (animal feed, fertilizers, new materials, etc.). Animal waste in any form is not a place to dump or uncontrolled disposal sites in different ecological health and value to the social, economic and even political reasons. Animal waste for many years in BH environmental, health and veterinary use and disposed of as animal feed in early seventies in the systems and Siemens, Agrokomerc Bimex, etc. Today, BH has over 2500 registered meat processors in the Federation of Bosnia and Herzegovina (FBH) app. 1400, in Republic of Srpska (RS) approximately 1000 and approximately 400 District Brčko (DB). It is therefore necessary to establish mechanisms reached earlier practice, and improve them according to contemporary needs and intentions through the development of a regional network of rehabilitation animal use waste as a resource (feedstock) to generate new income.

(7) Existing legislation (laws, regulations, decisions, and similar documents) in all levels of socio-political organization must be consistently applied more pronounced with additional monitoring and interventionism ministries to ensure the safety of not only environmental but also achieve the economic effects. In addition, it should be use the experience of countries in the region that have similar patterns of development, and natural-environmental determinants.

(8) The most acceptable technical and technological solutions in the management of animal waste are incinerators with adequate eco-technologi-

cal procedure. Incineration of animal waste is the solution for safe disposal and destruction of waste generated in bioproduction, and in everyday life. Stationary installations for the incineration of waste must be in compliance with EN 746-1 A1-2010 (Industrial equipment for thermic treatment), and disposal of waste made by European Union (EU) standards No. 1069/2009 and No.142/2011 and the EU as such to install and use as environmental, animal health facilities suitable for the environment. Through the incinerator can be disposed of solid waste, human waste, liquid and gaseous / gas waste. The basic benefit is 60% – 80% energetic efficiency. Have multiple environmental and economic effects of this kind of disposal of animal waste. In conjunction with this system it is necessary to select subjects who possess the necessary capacities at the regional level, and state entities. One of these subjects is Grizelj dd company Sarajevo, which in turn nurtures and has introduced a system of quality control ISO 9001: 2008 and Environmental Management EN ISO 14 001: 2009.

(9) Technical and technological solutions of incineration place of animal wastes disposed of in a humane way in which through co-generation and three generation two-generation (CHCP) to establish an energy benefit in the form of heat, cooling and electricity as well as environmentally friendly solution which arises from emission of pollutants without color, taste and flavor and ash environmentally suitable.

(10) The excrement of animal origin (manure and blood and related metabolites) should be treated in accordance with environmental principles and sustainable development. Each subject should dispose of their own systems for phytoremediation of animal waste prior to its inclusion in any of the segments of the environment, particularly in water and soil. Phytoremediation is ecologically safe and economically efficient and socially rational. Inventory of the necessary entities, insurance consulting, implementation and effective monitoring. This way they can dilute environmentally contaminated surface and groundwater, and soil.

(11) The manure used in accordance with the carrying of local soil in relation to nitrate and especially phosphate fertilizers as controlled in a sustainable bioproduction. Manure is an excellent resource for obtaining biogas which is used successfully in the district heating system and electrification. Establishment of biogas stations also contribute to reducing greenhouse gas emissions – obligation of all members of EU. In this way, BH can reduce emissions from existing conventional power plants by approximately 10%.

(12) As a special priority in the optimization of the situation in sector of animal waste is inventory and topographic determination of geographical coordinates of the subjects involved in this activity, and temporary or permanent disposal sites and illegal dumps animal waste, including sites that have done or continue to perform euthanasia of dead animals. Special priority has karst of BH as environmentally vulnerable area. After mapping approach to identify programs for sustainable management of organic waste and remediation of previous landfill in accordance with the principles of ecological restoration.

(13) To complete identification of spatial-ecological and socio-economically most acceptable location for the establishment of adequately equipped sites for the collection, storage and disposal of animal waste bound to the network producers of animal waste, and systems for its incineration, recycling to achieve environmental and economic – to get a sustainable energy. In all phases of the necessary studies on environmental impact assessment, "cost benefit" analysis, contingent analysis and other instruments compatible mission of sustainable development and safe life.

(14) To review the available documents (strategies, programs, regulations) that treat animal waste management at all levels of socio-political organization (municipalities, cantons, entities) in accordance with real needs and actual situation on the field.

(15) To continue to monitor the continuity of new engineering techniques in the field of animal waste management and legislation.

(16) To continue the cooperation of the Academy of Sciences and Arts of Bosnia and Herzegovina with government departments and scientific and educational institutions, national and international institutions and economic entities that will implement the project, for the protection of the environment (nature and environment) to ensure stimulating and favorable loan funds from the IPA, EBRD, the World Bank for the Project of *Management of animal waste and sustainable development*.

(17) To achieve of the required sustainability in the management of animal waste and animal sector as a whole, it is necessary to greening of system, the existence of political commitment at the local, regional and national level, a thorough approach to the application of "PP" ("prevention pollution"), the knowledge and assessment of market viability. As an instrument in achieving this mission is the creation of scientific and professional

projects with the following structural-functional units: (i) The situation in the sector, (ii) Ecological-environmental aspects, (iii) Health-ecological aspects, (iv) Technical and technological solutions, (v) Social aspects, (vi) Economic analysis, (vii) Political reflexions. As a *Center of Excellence* in the realization of this project is the ASABH in cooperation with the target entities and other reference institutions and individual experts.

Zbornik radova Naučno-stručnog skupa sa međunarodnim sudjelovanjem "UPRAVLJANJE ANIMALNIM OTPADOM I ODRŽIVI RAZVOJ" 26. juna/lipnja 2011, Sarajevo, Bosna i Hercegovina.

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