



**ROMANIAN ACADEMY
CENTER FOR STUDIES AND RESEARCH
IN AGROFORESTRY BIODIVERSITY "Acad. David Davidescu"**

HABILITATION THESIS

Professional scientific and academic performances obtained in gynecology, andrology and obstetric from veterinary medicine, necessary for eco-innovative application on reproduction biotechnology in livestock biodiversity, through integrated eco-bio-economics solutions in one medicine, based on ecosanogenesis

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Senior research

Member of Romanian Academy

Member of Academy of Agricultural and Forestry Science

Member of Romanian Academy of Scientists

PREFACE

Now at the end of this synthesis of "Habilitation Thesis" are profound grateful to all my teachers who guided me to the highest professional competence and moral probity on nicest roads, but difficult of knowing through scientific research performant, during my professional youth and maturity for 55 years (September 1959 when I became a student at the Department of Animal Science of the Faculty of Agriculture from Agronomic Institute "Nicolae Bălcescu" in Bucharest, where in 1964 I graduated in Faculty of Veterinary Medicine and that until September 2014 when I finalized this text).

At the same time and equally thank them collegial and cordial to all my collaborators working groups for scientific research for over 30 years from Agronomic Institute "Dr. Petru Groza" Cluj-Napoca (which after the Revolution of December 1989 has changed in USAMV Cluj), ie the period January 1, 1955- January 1, 1995, when I was transferred to Bucharest at the Laboratory of Biotechnology and Biodiversity, and in 2006 change the name in "Center for AgroBiodiversity Acad. David Davidescu" from National Institute of Economical Reserches "Costin C. Kirițescu" of Romanian Academy.

It is evident that about half of a century is a relatively long way and I hope that in part have been different joys and perhaps even some notable results; are also very sure that there were many difficulties, failures and even mistakes, that everything is specific to real life.

At the end of this afterword I express a deep sense of gratitude the memory of my parents, grandparents, great-grandparents and my uncles who make a dedication arch over time with the hope that I not disappointed a lot. In the same sense I address and my family all thanks to full support moral, social and professional that I have given generously and I think a good part of my eventual scientific successes are due to the intellectual climate of the extended family.

I am optimist for the future and I want to continue to finish some of my projects and the Strategic national consensus for a modern and prosperity in Romania, in a changing multipolar world.

I thank to the Great and Almighty God with all reverence and humbleness for all has given me so far and ask him to give me a few more years of intellectual biopower us spiritual fulfillment.

Postscript

I am very honored that my last rows and thoughts to express now for leadership, colleagues, collaborators and friends that I had in the Academic Cluj, a veritable another time Heidelberg, and have the highest respect and gratitude because have been hospitable hosts in youth and my first professional maturity, that I was honored with the highest title of Doctor Honorius Causa, and now agreeing to present at the Faculty of Veterinary Medicine Cluj-Napoca this Habilitation Thesis, as a the unique and peak moment in my life.

FIRST PART – Abstract

I sustained doctoral thesis in the field of veterinary medicine, in 1971 from the former Timisoara Agronomic Institute under the leadership of Prof. Nicolae Gluhovschi DVD, PhD, Dr. habil., member of the The New York Academy of Sciences and of The Royal Society (the National Academy of Science in the UK). Thus, at the age of 30 years, I was in Romania one of the youngest and first doctor in veterinary medicine from the Faculty of Veterinary Medicine Timisoara. In over 43 years since of my confirmation my PhD by former PhD Degrees Commission from the Ministry of Higher Education, I conducted a permanent scientific, professional and academic activity, who, with great modesty and respect for my teachers and mentors, for my family and my friends, try to do it in the limits of abilities thesis format.

In Section I, named „Thematic directions in the breeding of farm animals and animal breeding”, on 21 pages, 8 tables and 12 figures are presented in a total 10 thematic directions, 5 disciplinary and 5 interdisciplinary (according to their titles specified in Section I). Original research presented in the first 5 disciplinary thematic directions were and are confirmed that the current scientific work supported at international level by me and published, based on rigorous scientific professional selection, made by international personalities at World Congresses of Reproduction and Artificial Insemination, from Paris (1968) and from Munich (1972) and the International Conference of Biotechnology of Reproduction in Munich (1970), Cadarache near Marseille (1974) and Cambridge (1991), including the World Congress of Veterinary Medicine in Moscow (1979) etc. They also, were and are confirmed as scientific priorities at international level, with over 10 patents, which are first author (eg. uterine biopsy instruments for cows and sows; artificial vagin for biotech semen colection from breeding stallions and boars; insulated glass to dilute semen from breeding rams, boars and cocks; device for zygotes biotechnological transfer in cows; methods and recipes for frozen semen from breeding boars and cocks etc.). For the other five interdisciplinary thematic directions, the personal original results were and are especially presented and published in several international congresses, symposia and conferences organized in the Romanian Academy, in the Academy of Agricultural and Forestry Sciences and in the Academy of Medical Sciences and abroad to Athena (2010), Cambridge (2011), Palma de Mallorca (2011), Venice (2012) by WSEAS and known international event named Green Week in Berlin from 2011 to 2013 etc. All these prestigious international scientific events, both I and my collaborators from my working group presented original scientific results obtained in two's international POSDRU projects, ID 63258 and ID 77082 obtained in the competitive system, with funded by the European post-accession. These two projects were conducted with experts from Center for Studies and Research in Agroforestry Biodiversity "Acad. David Davidescu", from National Institute for Economic Research of the Romanian Academy. This center was organized by me in 2001 through activity of Senior research as a laboratory for „Biotechnology of reproduction” and I leads it like director since 2006. Thus, we created new concepts integrated "agrifood green power", "rural eco-bioeconomy" "smart eco-bio-geo-economy" „eco-geoconomics integrated bioplatforms” „eco-bio-diplomacy” „integrated enviromental health” etc. which have been accepted for publication in several journals indexed ISI.

In the Second Section, I present my plans for the future, them I forecasted on their triple size in professional, scientific and academic, so the main directions of scientific research are continuing on biosciences veterinary medical and compared, through strategies

for eco-bio-geo-cosmo-economics glocalize solutions needed to prevent and combating poverty, hunger, social exclusion and food insecurity, through paradigms and paradoxes of the new concept of "one medicine" approach using smarter technologies advanced studies and research in biodiversity genomics and traceability, in the natural bioresources food, multifunctional, transgenic and biostimulation, in a changing multipolar world of the twenty-first century. Progress plans and development of my career in the university area/space for over half a century, is based on the directions of teaching at the excellence level for the Doctoral and Postdoctoral School for Bioeconomics Veterinary Medicine of Romanian Academy. I wish that all these academic courses to be doubled in the directions of practical applications, the technology transfer in animals farm and food bioindustry based on successful partnerships and consortiums with innovative SMEs.

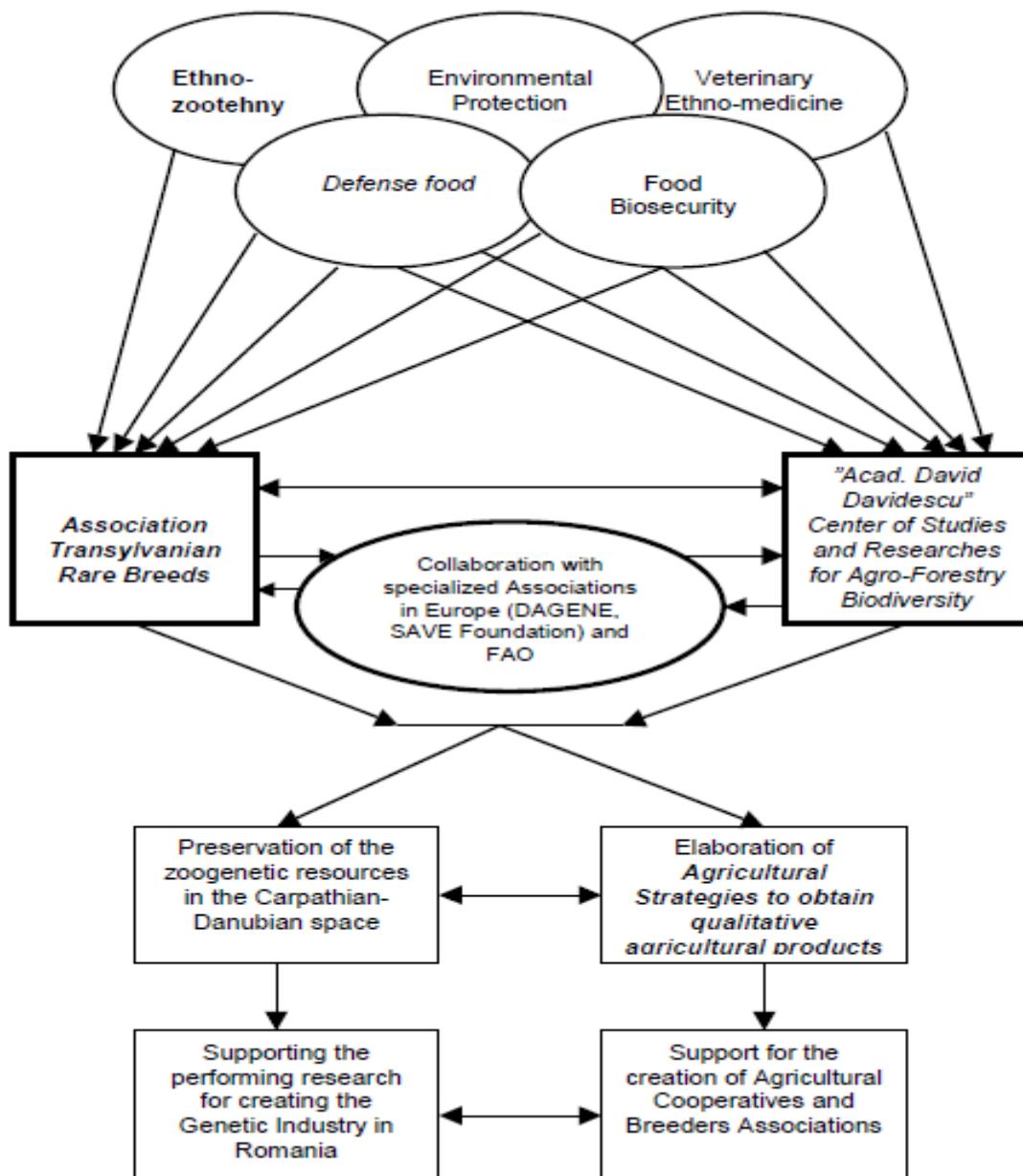


Fig. 1. The implementation of the European Action Plan regarding the increase in economic competitiveness and the decrease of the rural poverty
 (orig. Alexandru T. Bogdan, Marcel Matiuti, Dorina Bogdan, Carmen Matiuti and Amalia Străeanu - 2012)

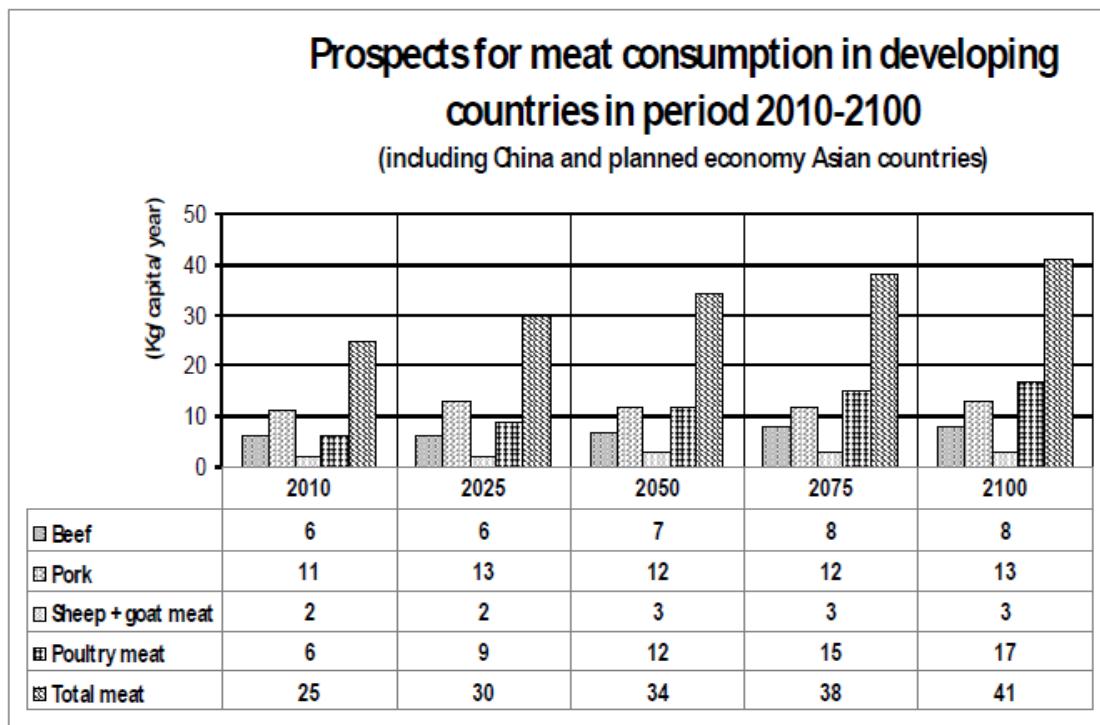


Fig. 2. Prospects for meat consumption (kg/capita/year) in developing countries in period 2010 – 2100 (correlation calculate by Alexandru T. Bogdan, Radu Burlacu, Ion Surdu and our working group, using bata base on The State o Food Insecurity in the World 2004)



„Project co-financed from the European Social Fund through the Sectorial Operational Programme Human Resources Development 2007-2013, POSDRU/CPP 107/DMI 1.5/S/77082/2010”

ROMANIAN ACADEMY

“COSTIN C. KIRIȚESCU” NATIONAL INSTITUTE OF ECONOMIC RESEARCHES

“Acad. David Davidescu” Center of Studies and Researches for Agroforestry Biodiversity

BIODIVERSITY OF THE FARM ANIMALS AND ECO-BIOECONOMICS SIGNIFICANCES IN THE FOOD SECURITY CONTEXT

Second Edition – Volume I*



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INSTITUTUL NAȚIONAL DE CERCETĂRI ECONOMICE
„COSTIN C. KIRIȚESCU” al ACADEMIEI ROMÂNE

Centrul de Studii și Cercetări de Biodiversitate Agricolă
„Acad. David Davidescu”

AGROFORESTRY BIODIVERSITY AND ECO-BIO-ECONOMIC SIGNIFICANCES IN CORRELATION WITH FOOD SECURITY

Coordinator:

Alexandru T. BOGDAN

Corresponding member of the Romanian Academy

* The funds for editing this volume are provided by the project POSDRU/89/1.5/S/63258 „Postdoctoral school for zootechnical biodiversity and food biotechnology based on the ecoeconomy and the bioeconomy required by ecosanogenesis” co-financed from the European Social Fund through Sectorial Operational Programme Human Resources Development 2007-2013

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THE PUBLISHING HOUSE OF THE ROMANIAN ACADEMY
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SECOND PART

SCIENTIFIC AND PROFESSIONAL ACHIEVEMENTS, EVOLUTION AND CAREER DEVELOPMENT PLANS

SECTION I

“THEMATIC DIRECTIONS FOR PROFESSIONAL, SCIENTIFIC AND ACADEMIC PERFORMANCES OBTAINED IN THE FIELDS OF REPRODUCTION IN FARM ANIMALS AND IN VETERINARY REPRODUCTION”

In Section I, named „Thematic directions for professional, scientific and academic performances obtained in the fields of reproduction in farm animals and in veterinary reproduction”, on 30 pages, 7 tables and 25 figures are presented in a total 10 thematic directions, 5 disciplinary and 5 interdisciplinary : 1). Veterinary Gynecology; 2). Veterinary Andrology; 3). Veterinary Obstetrics; 4). Veterinary Infant animal care; 5). Nuclear medicine veterinary and those 5 more interdisciplinary thematic directions: 6). Bio-economy, biodiversity and bioresources breeding farm animals; 7). Eco-economy, ecology and ecopathology breeding of farm animals; 8). Eco-bioeconomy, eco-biomanagement and eco-biomarketing of farm animals; 9). Eco-bio-geoconomy, eco-bio-geostrategies and eco-bio-geo-solutions in indices dynamic for breeding farm animals; 10). Rethinking smarter for eco-bio-geo-political work necessary to food safety and security, which include their original results obtained by biochemical methods (eg. hormonal profile and metabolic profile in animals breeding; biochemistry spermograms; ovocitogramme and biochemical zigotogramme); biophysical methods (eg. electron microscopy in gametes cryopreservation and thyroid scintigraphy in the lactation physiology of cattle breeding); citohistologic methods (eg. anteropituitary citohistotopochemistry of farm animals). Original research presented in the first 5 disciplinary thematic directions were and are confirmed that the current scientific work supported at international level by me and published, based on rigorous scientific professional selection, made by international personalities at World Congresses of Reproduction and Artificial Insemination, from Paris (1968) and from Munich (1972) and the International Conference of Biotechnology of Reproduction in Munich (1970), Cadarache near Marseille (1974) and Cambridge (1991), including the World Congress of Veterinary Medicine in Moscow (1979) etc. They also, were and are confirmed as scientific priorities at international level, with over 10 patents, which are first author (eg. uterine biopsy instruments for cows and sows; artificial vagin for biotech semen collection from breeding stallions and boars; insulated glass to dilute semen from breeding rams, boars and cocks; device for zygotes biotechnological transfer in cows; methods and recipes for frozen semen from breeding boars and cocks etc.). For the other five interdisciplinary thematic directions, the personal original results were and are especially presented and published in several international congresses, symposia and conferences organized in the Romanian Academy, in the Academy of Agricultural and Forestry Sciences and in the Academy of Medical Sciences and abroad to Athena (2010), Cambridge (2011), Palma de Mallorca (2011), Venice (2012) by WSEAS and known international event named Green Week in Berlin from 2011 to 2013 etc.

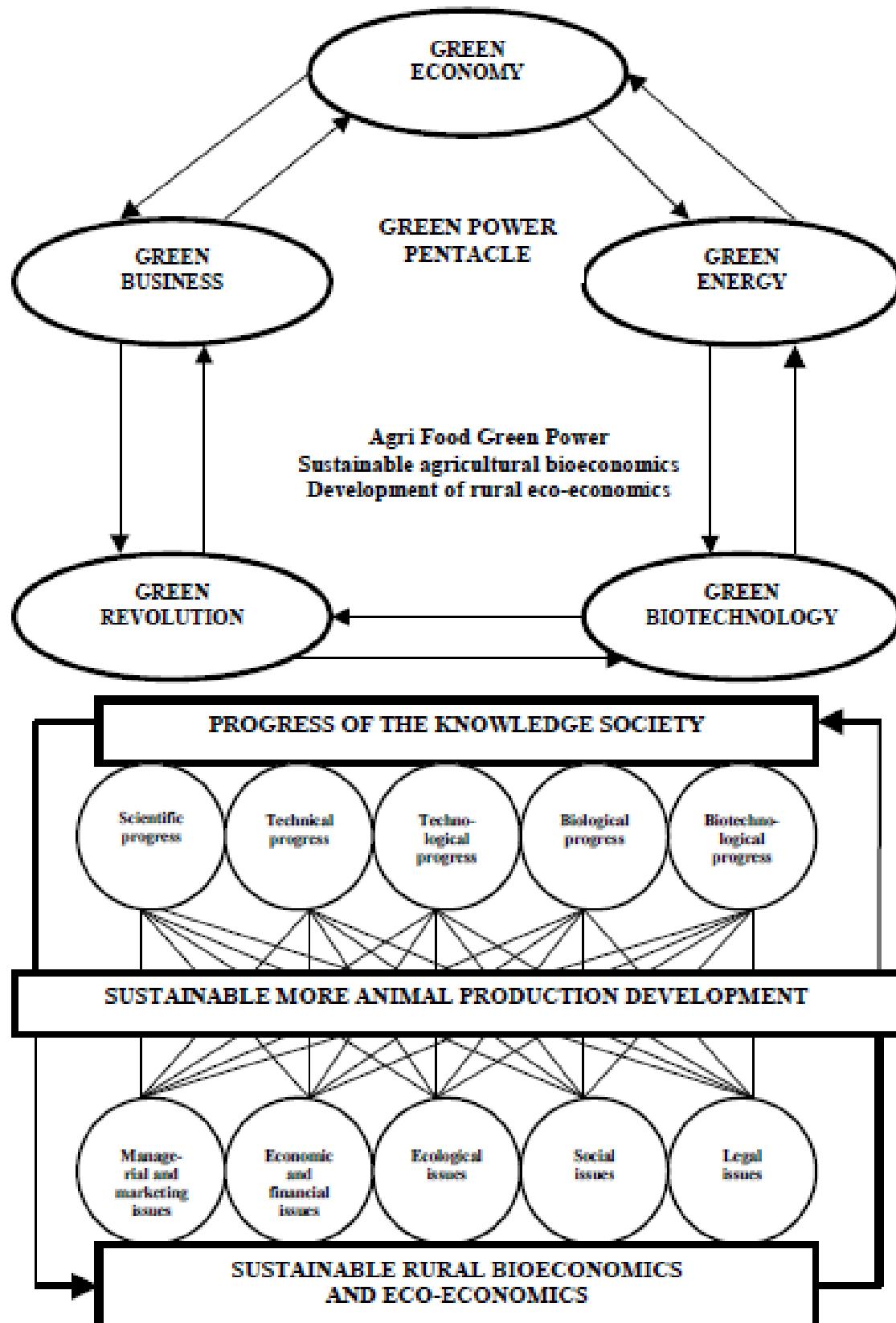


Fig. 3. The components of the Green Power pentacle, correlated with sustainable more animal production development based on sustainable rural bioeconomics and eco-economics
(orig. Alexandru T. Bogdan, Dorina Bogdan and Amalia Străteanu - 2007)

All these prestigious international scientific events, both I and my collaborators from my working group presented original scientific results obtained in two's international POSDRU projects, ID 63258 "Postdoctoral school for zootechnical biodiversity and food biotechnology based on the eco-economy and the bio-economy required by eco-sanogenesys" and ID 77082 "Doctoral Scholarships for eco-economy and bioeconomic complex training to ensure the food and feed safety and security of anthropogenic ecosystems" obtained in the competitive system, with funded by the European post-accession. These two projects were conducted with experts from Center for Studies and Research in Agroforestry Biodiversity "Acad. David Davidescu", from National Institute for Economic Research of the Romanian Academy. This center was organized by me in 2001 through activity of Senior research as a laboratory for „Biotechnology of reproduction” and I leads it like director since 2006. Thus, we created new concepts integrated "agrifood green power", "rural eco-bioeconomy" "smart eco-bio-geo-economy" „eco-geoeconomics integrated bioplatforms” „eco-bio-diplomacy” „integrated environmental health” etc. which have been accepted for publication in several journals indexed ISI.

**The 12th International Symposium
PROSPECTS FOR 3rd MILLENNIUM AGRICULTURE
26 - 28 September, 2013
Cluj-Napoca, Romania**

USE OF MOBILE LABORATORIES FOR APPLICATION FOR REPRODUCTIVE BIOTECHNOLOGIES IN FARM ANIMALS

Autor: George Flora TOBA, Ioan Stefan GROZA, Alexandru T BOGDAN, Ioan VINTILA, Valerica DANACU, Marcel Theodor PARASCHIVESCU, Corneliu SONEA, Marian OCHEA, Levente SZABO, Niculae CRACIUN, Mircea ROMAN, Sorin Radu SEREA

INTRODUCTION

Application of reproduction biotechnology in livestock breeding can be made in mobile laboratories, designed and built in E.T. centers on different types of auto-laboratories and computerized laboratories for researches biotechnologies, including biotechnology of reproduction and genetic engineering, partitioned to ensure a standardization operation phases.

Aim: The main goal was to construct, test and use different auto-laboratories for E.T. and computerized laboratories, after the models of some recognized companies and use of these mobile laboratories in breeding farms from Romania, for production biotechnologies (A.I. and E.T.) in local rural conditions, including aquaculture farms.

Materials and methods: In Romania auto laboratories for embryo transfer in farm animals were used both in veterinary medicine and animal science faculties from Timisoara (1983) and from Cluj (1985) and also, at scientific research stations Taga Moes (1980) and Balatoni (1985); that are still active (in Taga Moes, in Satu Mare, and also in the private system).

MATERIAL AND METHOD

In Romania auto laboratories for embryo transfer in farm animals were used both in veterinary medicine and animal science faculties from Timisoara (1983) and from Cluj (1985) and also, at scientific research stations Taga Moes (1980) and Balatoni (1985), that are still active (in Taga Moes, in Satu Mare, and also in the private system).

RESULTS AND DISCUSSION

In this paper are presented images with specific activities for applied reproduction biotechnologies in animal farms from the rural space in Romania, including the mountain area and original numerical data obtained along the year by our specialists' teams with official recognition, as requested by International Embryo Transfer Society.

Very recently (2013), some specialists from our authors team presented different computerized laboratory models at DAGENE meeting in Timisoara, after the model of computerized laboratories from Gen Bank of rare animal breeders.

Though, computerized laboratories, that exist in many countries, like Germany, U.S.A. and Australia, in which have worked some specialists from our team of authors of this article. As a novelty for Romania, are the computerized laboratories, including helicopter laboratory for environmental and ecological monitoring used worldwide.

CONCLUSION

For the first time in a symposium at university of agriculture and veterinary medicine, by veterinary medicine faculty is presented in our country the use of mobile laboratories, with examples of auto laboratory and computerized laboratory for application of reproductive biotechnologies and biengineering in livestock production, including aquaculture farms.

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Habilitation thesis constitutes a mirror of career paths, scientific achievements represented by articles and books, which are found in the list of publications of the researcher, working in the Romanian Academy, in the Center for Studies and Research in Agroforestry Biodiversity "Acad. David Davidescu"

By structure, Habilitation thesis reflects the research and teaching across the candidate presenting objectives and outcomes after obtaining PhD in Veterinary Medical Sciences.

The targets of the Biodiversity Center is the durable exploitation of animal genetic resources, the conservation of animal genetic biodiversity, the realization of a biotechnological bank of Animal Genetic Resources (AGR) of preserving the genetic background of farm animals by applying modern reproductive biotechnologies. We will pursue the realization of two objectives: analysis objectives, description of animal genetic resources, which group the rules for investigation and surveillance, a genetic evaluation of rare characters and experimental objectives, of conservation of the animal genetic resources by applying reproduction biotechnologies and using the methodology specific to obtaining, handling and freezing the sperm; obtaining, cultivating and freezing eggs and embryos. We consider it is obvious that any kind of forecasting or prospective study regarding the dynamic of agro-food production on a period of several decades (in our study the interval is 2010-2050-2100) must begin with the presentation of the population dynamic at global and regional levels.

Sample collection with the TypiFix™ System for Scrapie-genotyping of sheep

Sample collection of small tissue probes with the TypiFix™ system

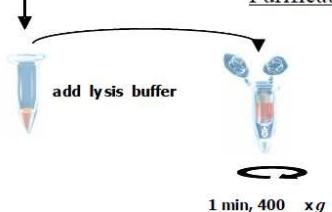
Sample aquisition

error-free sample processing in the lab by automatic aquisition of the sample ID and transcription into the data base

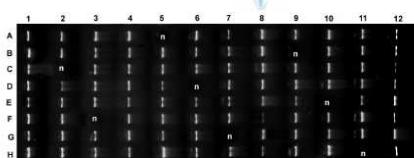


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Moleculargenetic analysis PCR

Tab. 1

DNA profile of pig samples obtained by analysis of 5 microsatellite markers (S0386, SW24, SW240, SW857, SW951) and results of identity control (after Alexandru T. Bogdan, Istrate Judith and al., 2009)

Lab no.	Typifix no.	Sample	S0386	SW24	SW240	SW857	SW951					
US080007	1	animal	174	176	101	107	93	105	143	149	120	
US080008	51	animal	174		107	113	95	111	147	149	120	122
US080014	57	meat	174		107	113	95	111	147	149	120	122
US080009	52	animal	174		93	101	91	107	139	151	120	
US080015	58	meat	174		93	101	91	107	139	151	120	
US080010	53	animal	174		93	101	93	107	139	149	120	
US080017	60	meat	174		93	101	93	107	139	149	120	
US080011	54	animal	174	176	99	117	95		149	151	120	122
US080016	59	meat	174	176	99	117	95		149	151	120	122
US080012	55	animal	174	176	113		95		139	149	120	
US080018	61	meat	174		113		95		139	149	120	
US080013	56	animal		176		101	93	95	147	155	120	
US080019	62	meat		176	176	107	113	91	111	139	143	120
US080039	94	animal		184	184	93	107	95	105	149		120
US080040	95	animal		168	176	113		95	105	149		128

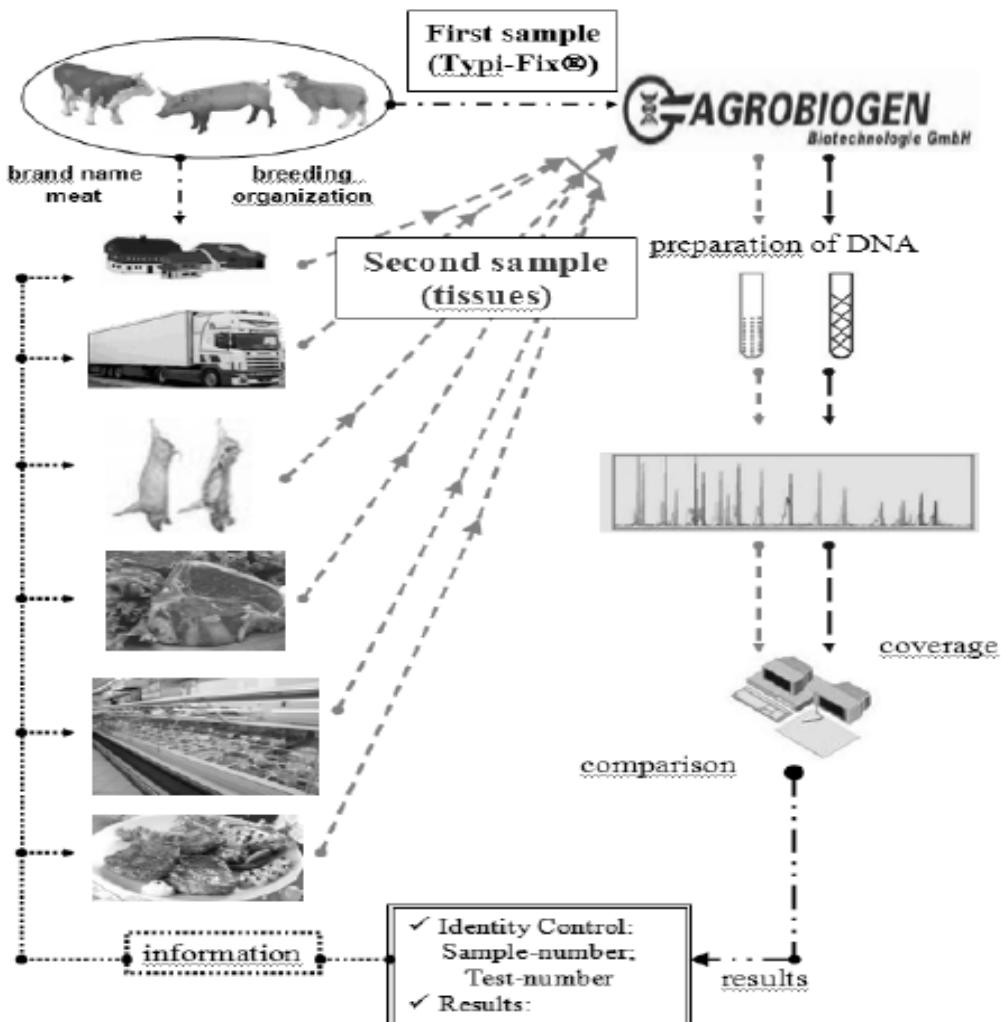


Fig. 4. The leading lab correlations with traceability of meat products through the new method of Prof. G. Brem and his team from AGROBIOGEN, Germany (image obtained in 2008 by Prof. A.T. Bogdan)

We consider it is obvious that any kind of forecasting or prospective study regarding the dynamic of agro-food production on a period of several decades (in our study the interval is 2010-2050-2100) must begin with the presentation of the population dynamic at global and regional levels. It is a known fact that population statistics is well establish on scientific basis and as such we will present graphics and tables with the dynamic of global population levels, on the basis of the highest bibliographical sources authorized by known scientific documentation (for example the UN Department for Population).

World livestock production has been analyzed in parallel with the official statistical data regarding the consumption of agro food products and nutrients respectively, as forecast up to 2050-2100 and correlated with population growth, production and consumption demands for vegetal and animal food products, level of poverty and risks on other vulnerabilities: economic, social, environmental, reduction of natural resources, pollution, atmospheric emissions, all correlated with farm production, etc. The analyses made are characterized by: comprehensiveness, reproducibility, certitude and consistency. Average annual rates of population change show that Africa has experienced considerably faster growth than any other major area, for most of the 1950-2000 periods. Growth rates reached a higher peak in Africa (2.86%) than anywhere else—in the early 1980s, at least 15 years after growth had begun to decline in every other major area.

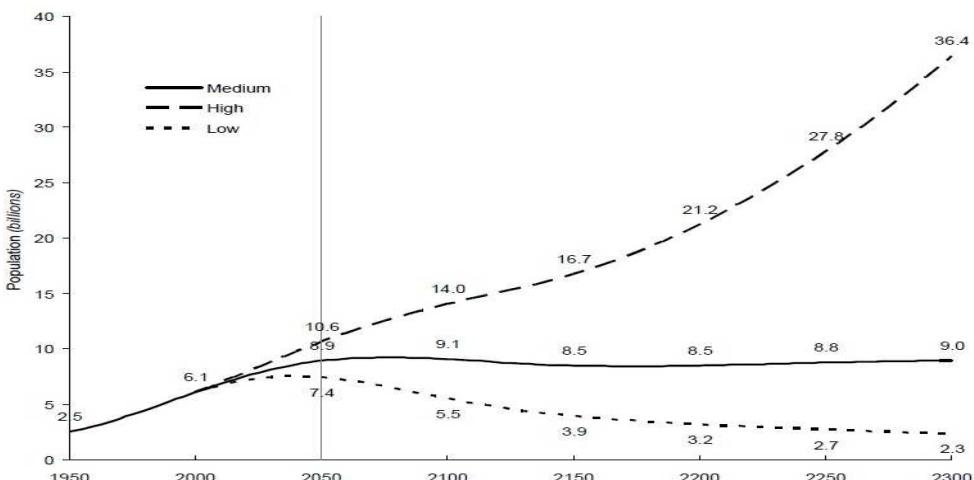


Fig. 5. Forecasting the change in world population over 50 year periods, estimates and three scenarios: 1950-2300 by United Nations, New York, 2004, Department of Economic and Social Affairs, Population Division. Note: This is the first signaling of this important study, in relation with bio-eco-economy and justifies the scientifical researches for ensuring the food of humankind on long and very long-term, **representing stability in developing of agrifood and seafood production for globalised biopower.**

It is evident that an increasing of 1/3 of actual world population put a lot of different ethics (bio-ethics), economics (bio-economics), medical (bio-medical), ecological, juridical, and philosophical. All these aspects have a strong social impact with germinate a severe and long crisis, including agro-food crisis and unfortunately moral crisis. The projection for Africa, consequently, shows growth declining belatedly, though nevertheless following a downward path similar to that in other major areas. Europe is at the other end of the spectrum, with growth rates having just turned negative and continuing to fall up to 2050. Africa again stands out, not only because of the much lower level of life expectancy but also

because it is the only major area where projections show any decline in life expectancy for any period.

For me is very important the message of Terri Raney et al. (FAO – The State of Food and Agriculture 2009 – Food and Agriculture Organization of the United Nations – Rome, 2009). One of the key messages published in the report made by the group of experts in Rome in June 2009 is essential: “*The livestock sector is one of the most dynamic parts of the agricultural economy. The sector has expanded rapidly in recent decades and demand for livestock products is expected to continue growing strongly through the middle of this century, driven by population growth, rising affluence and urbanization*”. The global livestock sector is characterized by a dichotomy between developing agriculture, developing rural zones and developing countries.

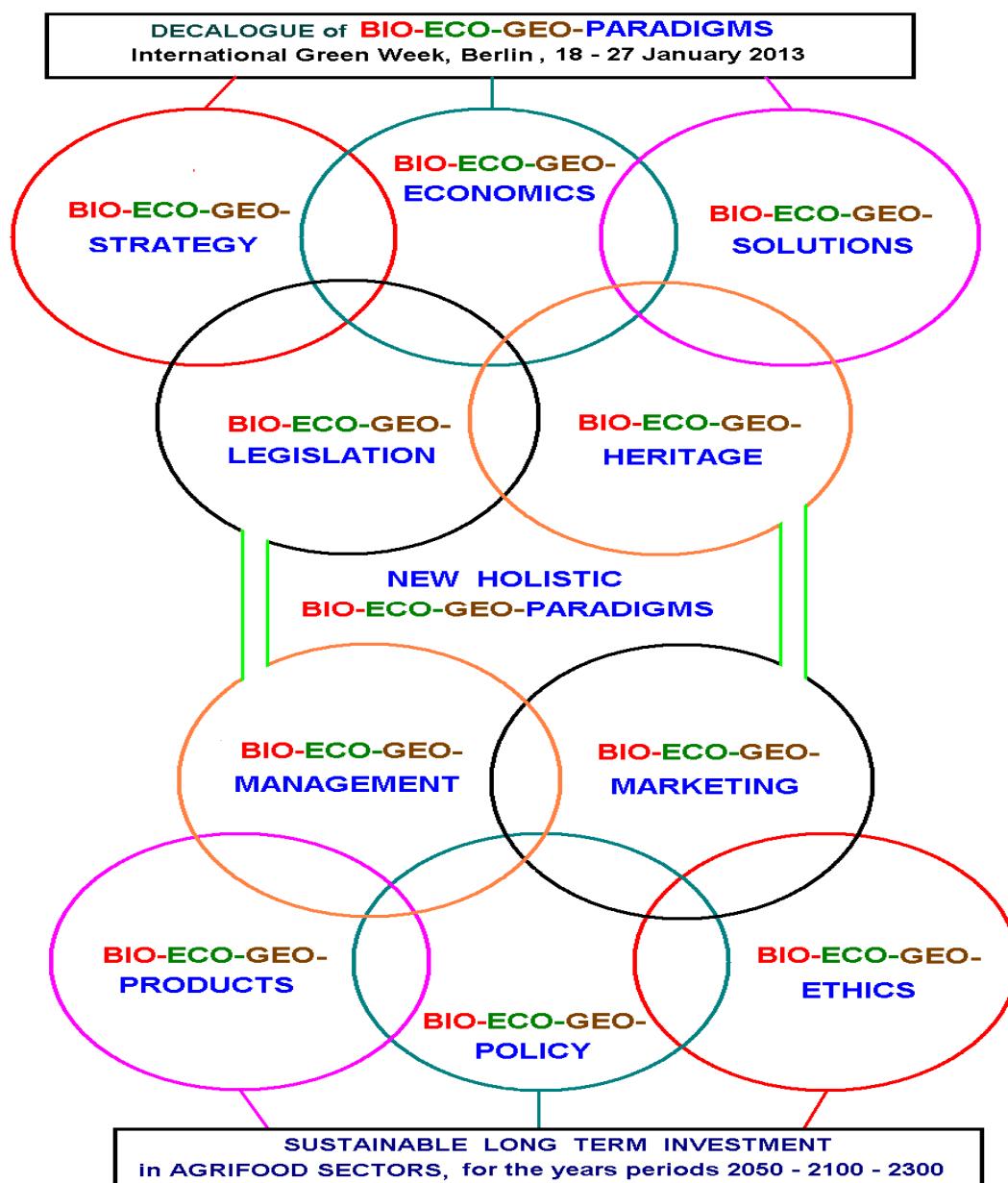


Fig. 6. New holistic Bio-Eco-Geo-Paradigms, sustainable long term investment in agrifood sectors, for the periods 2050 – 2100 – 2300
(orig. Alexandru T. Bogdan, Dorina Bogdan and Amalia Străeanu, 2013)

Decisive action is required if the sector is to satisfy this growth in ways that support society's goals for poverty reduction and food security, environmental sustainability and improved human health. Livestock products contribute 17% to kilocalorie consumption and 33% to protein consumption globally, but there are large differences between rich and poor countries (Rosegrant *et al.*, 2009).

At the same time, the expansion of agricultural production needs to take place in a way that allows the less well-off to benefit from increased demand and that moderates its impact on the environment. Livestock systems have both positive and negative effects on the natural resource base, public health, social equity and economic growth (World Bank, 2009). Alexandru T. Bogdan's working group, from the POSDRU project ID 63258 with title "Postdoctoral school for zootechnical biodiversity and food biotechnology based on the eco-economy and the bio-economy required by eco-sanogenesys", composed of experts with professional background, elaborated the *priority strategic national project and integrated through recently objectives of Lisabona 2020 Strategy*, with *main objective*: sustainable development by turning into profit the elements that generate material, economic and human value. These elements are specific for the competitive poles that exist in the current rural environment of Romania. Their characteristics: vegetal and animal production, derivatives developed in good geo-climate conditions, all of these made with support from the local community (at socio-cultural level, traditions, the school profile). The result of effective solutions that reconsider and resize notions of rural society and economy, provides the economic and technical space to develop jobs both in the innovative Agro-Forestry and Zootechny-Veterinary Bio-Parks (in the business centers for rural development, produces vegetal and/or animal derivatives, bio-fuels from plant waste, makes possible the use and exploitation of alternative energy sources).

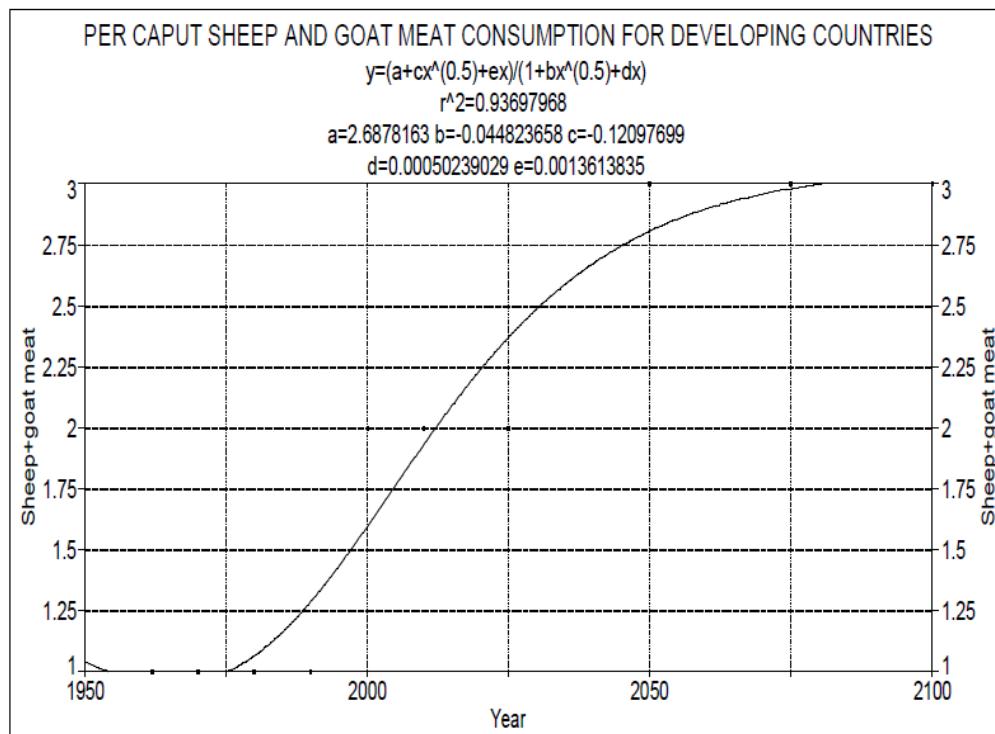


Fig. 7. Regression curve to describe the dynamic of sheep and goat meat consumption for developing countries (correlation calculate by Alexandru T. Bogdan, Radu Burlacu, Ion Surdu and our working group, using data base on *The State of Food Insecurity in the World, 2004*)

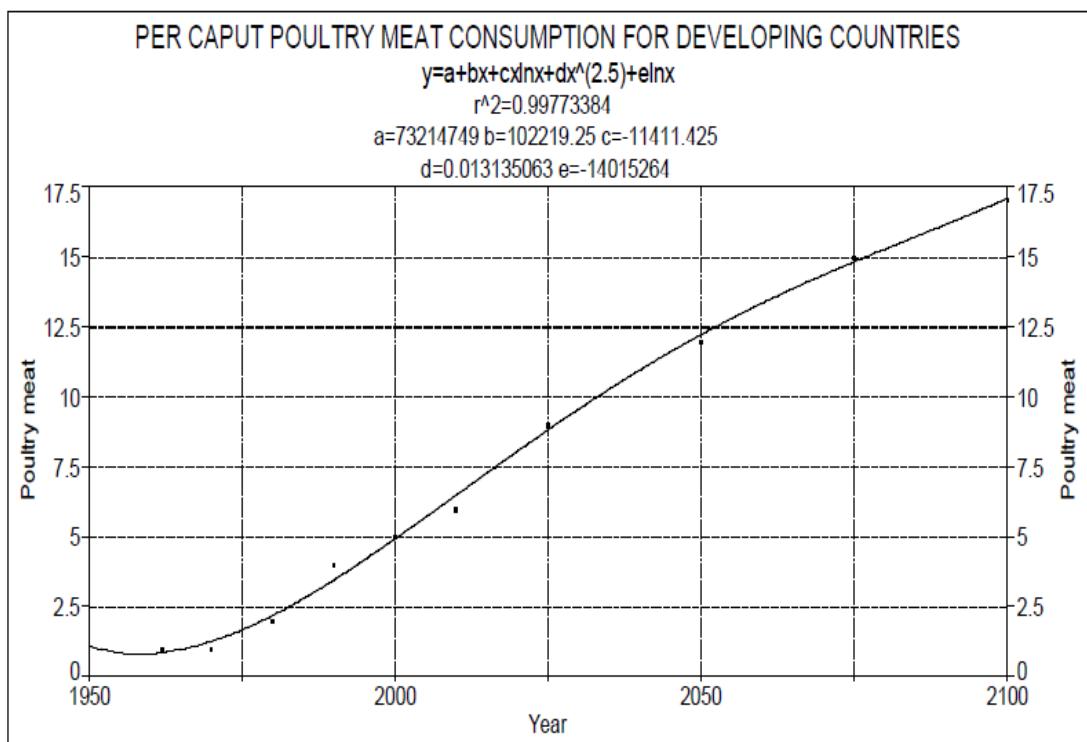


Fig. 8. Regression curve to describe the dynamic of poultry meat consumption for developing countries (correlation calculate by Alexandru T. Bogdan, Radu Burlacu, Ion Surdu and our working group, using data base on *The State of Food Insecurity in the World, 2004*)

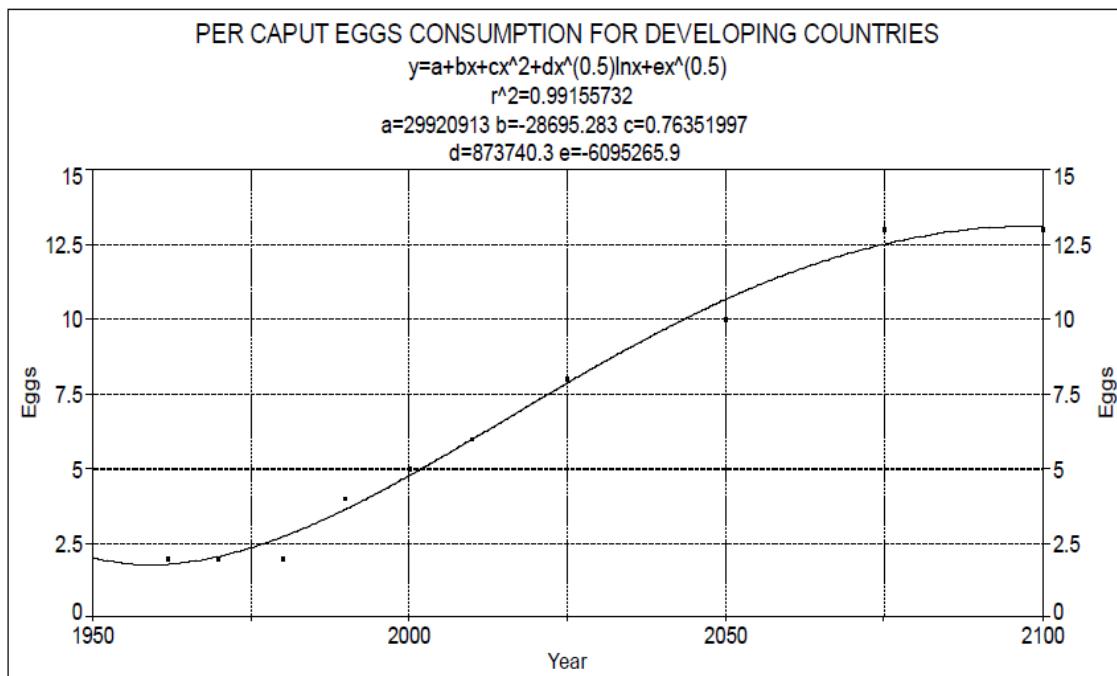


Fig. 9. Regression curve to describe the dynamic of eggs consumption for developing countries (correlation calculate by Alexandru T. Bogdan, Radu Burlacu, Ion Surdu and our working group, using data base on The State of Food Insecurity in the World, 2004)

The assessments presented have a calculation model as a basis as used by Rosegrant *et al.* on the basis of certain indicators obtained by processing statistical date from 2001, 2002, 2005, as published by FAO in the Reports and periodicals from 2007 to 2009.

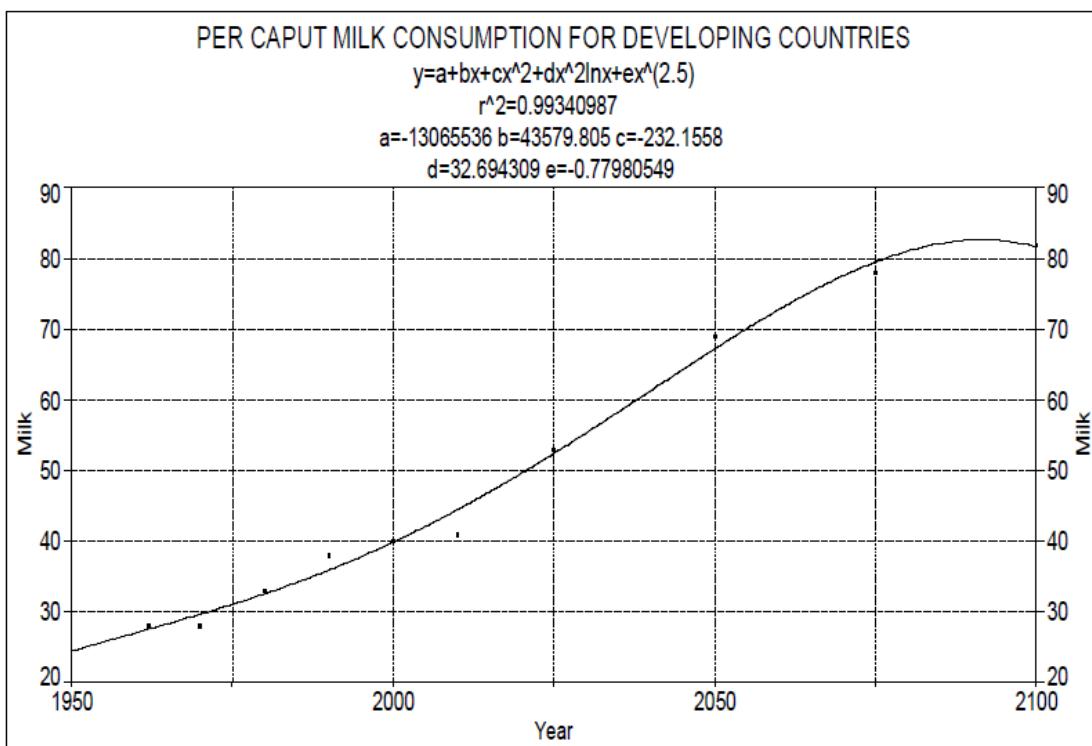


Fig. 10. Regression curve to describe the dynamic of milk consumption for developing countries (correlation calculate by Alexandru T. Bogdan, Radu Burlacu, Ion Surdu and our working group, using data base on *The State of Food Insecurity in the World, 2004*)

Tab. 2

The resulted “more animal production” potential of Romanian agriculture expressed by livestock and meat production of the 2025 year (orig. from AGRAL Project about Livestock Production in Romania for the periode 2005-2025, coodonating by Alexandru T. Bogdan, Dorina Bogdan and Amalia Străeanu – 2003)

Romania Model - dynamics for the 2025 year	Resulted meat production potential		Resulted livestock potential		Animals / inhabitants (no.)
	Meat live animals (thousand tones)	Meat in carcasses (thousand tones)	Total of livestock (thousand heads)	Animals to be slaughtered (no.)	
	“MORE ANIMAL PRODUCTION” potential of Romanian agriculture expressed by BOVINE dynamics				
	726	385	6.740	1.967	0.30
	“MORE ANIMAL PRODUCTION” potential of Romanian agriculture expressed by PIG dynamics				
	1.381	1.063	15.498	14.501	0.69

Tab.3

The credibility of “more animal production” in Romanian agriculture expressed by the livestock and meat production counted as potential, compared to already existing models in UE countries (orig. from AGRAL Project about Livestock Production in Romania for the period 2005-2025, coodinating by Alexandru T. Bogdan, Dorina Bogdan and Amalia Străteanu, 2003)

EU countries referred to when MORE ANIMAL PRODUCTION in Romania was counted	Animals / inhabitant (no.)	Potential livestock of Romania		Potential meat production of Romania	
		(thousand heads)	(thousand tones)		
“MORE ANIMAL PRODUCTION” potential of Romanian agriculture expressed by BOVINE dynamics					
Already existing model	Ireland	1,76	39.443	11.832	4.259
	France	0,34	7.619	2.285	822
	Denmark	0,34	7.619	2.285	822
	Belgium	0,34	7.171	2.151	774
“MORE ANIMAL PRODUCTION” potential of Romanian agriculture expressed by PIG dynamics					
Already existing model	Denmark	2,16	48.407	44.534	4.453
	Holland	0,82	18.377	16.906	1.690
	Belgium	0,72	16.135	14.844	1.484

Tab. 4

The credibility of “more animal production” in Romanian agriculture expressed by the livestock and milk production counted as potential, comparing to already existing models in UE countries (orig. from AGRAL Project about Livestock Production in Romania for the period 2005-2025, coodinating by Alexandru T. Bogdan, Dorina Bogdan and Amalia Străteanu – 2003)

EU countries referred to when MORE ANIMAL PRODUCTION in Romania was counted	Milk / Inhabitan t (kg)	Potential milk production of Romania			Necessary BOVINE livestock of Romania		
		Total milk	Milk to be consumed	Milk for export	Breeding stock	Total livestock (thousand heads)	
					calving		
0	1	2	3	4	5	6	7
“MORE ANIMAL PRODUCTION” potential of Romanian agriculture expressed by MILK PRODCTION dynamics							
Model of some EU countries	Ireland	1.437	322.046	62.750	259.296	8.051	9.148
	Denmark	836	187.355	62.750	124.605	4.683	5.321
	Holland	679	152.170	62.750	89.420	3.804	4.322
	Swiss	545	122.139	62.750	59.389	3.053	3.469
	Finland	483	108.245	62.750	45.495	2.706	3.075
	France	423	94.798	62.750	32.048	2.369	2.692
	Austria	413	92.557	62.750	29.807	2.313	2.628
	Germany	346	77.542	62.750	14.792	1.938	2.202
	Belgium	337	75.525	62.750	12.775	1.888	2.145
	Poland	304	68.129	62.750	5.379	1.703	1.935

Tab.5.

Prospects and forecasting for populations and livestock products in period 2010-2100 data base from developing countries communicated by FAO, Land and Water Bulletin 6, Roma, 1997, A.F. Bouwman, and by N. Alexandratos MID FAO, 2009, World foods and agriculture to 2030/2050; selected dates and % calculation from our working group

Region	Developing including China and CP Asian countries						2100
	Item	UM	2010	2025	2050	2075	
0	1	2	3	4	5	6	7
Population	Mil	5619	6802	8327	8917	9569	170,30%
Beef	Kg/cap/year	6	6	7	8	8	133,33%
Pork	Kg/cap/year	11	13	12	12	13	118,18%
Sheep + goat meat	Kg/cap/year	2	2	3	3	3	150,00%
Poultry meat	Kg/cap/year	6	9	12	15	17	283,33%
Total meat	Kg/cap/year	25	30	34	38	41	164,00%
Eggs	Kg/cap/year	6	8	10	13	13	216,67%
Milk	Kg/cap/year	41	53	69	78	82	200,00%

Tab. 6.

Prospects and forecasting for populations and livestock products in period 2010-2100 data base from Latin America Region communicated by FAO, Land and Water Bulletin 6, Roma, 1997, A.F. Bouwman, and by N. Alexandratos MID, FAO, 2009, World foods and agriculture to 2030 / 2050; selected dates and % calculation from our working group

Region	Latin America						2100
	Item	UM	2010	2025	2050	2075	
0	1	2	3	4	5	6	7
Population	mil	596	701	829	856	883	148,15%
Beef	Kg/cap/year	22	21	20	20	19	86,36%
Pork	Kg/cap/year	9	12	15	19	23	255,56%
Sheep + goat Meat	Kg/cap/year	1	1	1	1	1	100,00%
Poultry meat	Kg/cap/year	17	21	27	33	38	223,53%
Total meat	Kg/cap/year	49	54	63	73	81	165,31%
Eggs	Kg/cap/year	9	11	14	17	20	222,22%
Milk	Kg/cap/year	96	103	114	126	136	141,67%

There will be significant progress in raising food consumption levels and improving nutrition. There will be significant reductions in the relative prevalence of undernourishment (percent of population affected), but these will not be translated into commensurate declines in the numbers undernourished because of population growth. Reduction in the absolute numbers of undernourished is likely to be a slow process. The number of undernourished in the developing countries is not likely to be halved by 2015 from the 823 million of 1990/92 (the 3-year average used as the basis for defining the World

Food Summit target). However, the proportion of the population undernourished may be halved by 2015 and decline further in the rest of the projection period. The our projected slow progress in reducing undernourishment will reflect the inadequate progress of many countries towards rapid economic development and poverty reduction. However, empirical evidence suggests that in the countries with high dependence on agriculture, assigning priority to the development of food production holds promise of overcoming the constraint to better nutrition represented by unfavorable overall economic growth prospects. This prospect underlies the projection that the countries with long histories of stagnant food consumption levels and high undernourishment could make some progress in the future. Poor agricultural resources may represent a serious obstacle to such prospects, particularly in countries with high demographic growth. Despite this slow pace of progress in reducing the prevalence of undernourishment, the projections imply a considerable overall improvement. In the developing countries the numbers of well fed (i.e. not classified as undernourished according to the criteria used here) could increase from 3.9 billion in 1999/01 (83% of their population) to 5.2 billion in 2015 (90% of the population), to 6.2 billion (93%) in 2030 and to 7.2 billion (96%) by 2050. That would be no mean achievement.

In many countries, including some of the more populous ones, the relative prevalence of undernourishment (percent of the population) will decline significantly. Fewer countries than at present will have high levels of undernourishment, none of them in the most populous class. The problem of undernourishment will tend to become smaller in terms of both absolute numbers affected and, even more, in relative terms, hence it will become more tractable through policy interventions, both national and international.

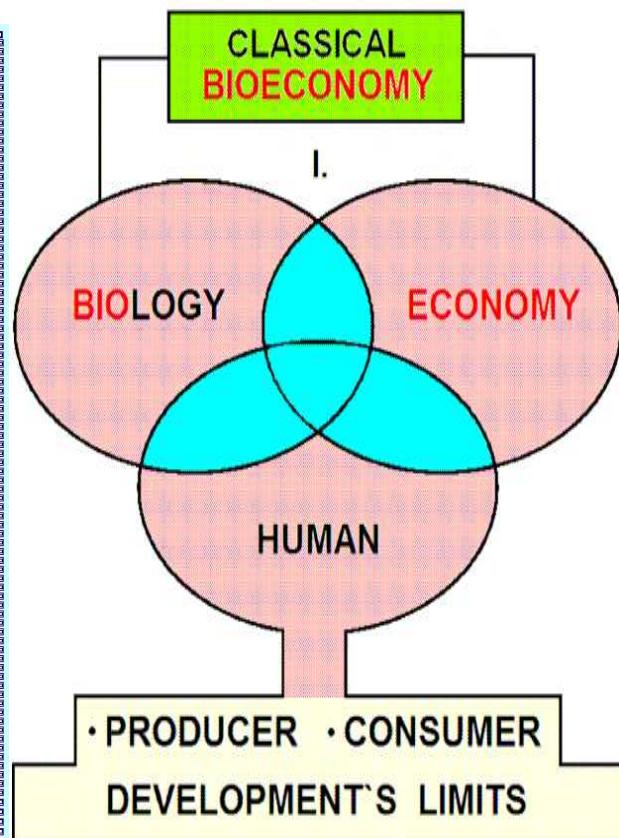


Fig. 11. Remarks for classical bioeconomy based on prioritary terminology using the term "bioeconomy" from Grigore ANTIPA (1906-1916) and Nicolas GEORGESCU-ROEGEN (1960-1975), with human significations of economy (orig. Alexandru T. Bogdan, Dorina Bogdan and Amalia Străeanu, 2006)

The livestock sector plays a crucial role in the provision of global public goods and services. There are opportunities to alleviate many of the risks associated with the expanding sector and to develop its full potential in ensuring benefits for the poor with a gender equality perspective, and to encourage a more responsible use of increasingly scarce inputs and natural resources. This will require dynamic generation and adoption of new technologies, products and services as well as networks and institutional development within an enabling policy and regulatory environment. The vigorous growth of the livestock sector, its importance for income generation, food security, human nutrition and health, and its impact on various public goods and services require careful attention by the international community.

The new my concept of Eco-Bioeconomy, based on my paradigm AgriFood Green Power

Bioeconomy, a concept elaborated and promoted by Nicholas Georgescu-Roegen (1906-1994) resulted in a theory which represents a revolutionary way inside economic concepts. Contrary to the previous way of thinking, theory of bioeconomy placed the industrial revolution and technical progress on one side and live world evolution and ecology on the other side. Such way N. Georgescu- Roegen, the economist with Romanian origins, got a decisive clarification with clear connotations in contemporary political economy.

The Green power is amplified by biodiversity. It is obvious that a sustainable economy of the future has to become a bio-economy, adapted to the rural area and based on a large biodiversity that will create first of all an opportunity for more producers of primary organic synthesis and further on for a longer line of consumers up to the final state of dead organic matter that must be mineralized. In this context, Nicolas Georgescu-Roeger's worldwide-known bioeconomics paradigm of improving the agricultural efficiency becomes most topical, particularly as mankind's limited natural resources are being depleted. Besides these new concepts presented so far, Alexandru T. Bogdan comes with a new concept presented in the paper *Eco-physiological aspects of the traditional product (slow) Food and its Eco-Bioeconomics impact* at the International Symposium of Veterinary Medicine in Cluj-Napoca in 2011. In this paper which have to do with meat and milk products, it is very much highlighted the importance of obtaining animal products of a very good quality. This quality cannot be obtained unless one uses inclusive from local breeds.

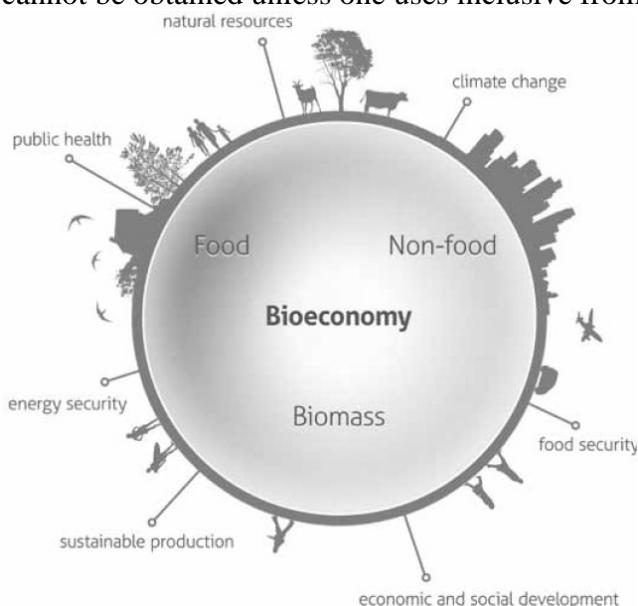


Fig. 12. The European Bioeconomy from The European Bioeconomy in 2030, p. 6.

The Bioeconomy refers to the sustainable production and conversion of biomass into a range of food, health, fibre and industrial products and energy. Renewable biomass encompasses any biological material (agriculture, forestry and animal-based including fish) as a product in itself or to be used as raw material. In many congresses,

New holistic approach of Eco-economics theories. In the last 30 years, and especially over the last 12 years, in the world speciality literature, through the complexity, depth and originality of innovative approaches of relationships between ecology and economy, another american scientist imposed – Lester R. Brown, founder of the well-known Worldwatch Institute and Earth Policy Institute, being also chosen member of the Romanian Academy. Through his book, entitled “Eco-Economy: Building an Economy for the Earth”, published in 2001 and translated in over 25 languages, spoken on every meridian of the world, the Romanian Academy member Lester R. Brown is unanimously recognized as the father of the new concept/paradigm of ecoeconomy. Recently, he published the book “Full Planet, Empty Plates: The New Geopolitics of Food Scarcity”, in which considers, with scientifical, geostrategical and social-economical arguments that the humankind already entered a new era, that of chronic shortage of food, thus considering that “the agricultural land (the soils) represents the new gold and the food is the new oil”. In this context, the author senses correctly the contradiction between the limited natural resources of the Earth and using the agricultural land for production of biofuels, being very well documented on new challenges and opportunities of the agro-food globalized crises.

Bridging between green economy and blue economy. In the current conditions, of unpermitted growth of numerous and varied major pollutant factors in all anthropic ecosystems, from those local to those regional and globalized, scientists and an important part of the responsible civil society fights vigorously and with plausible arguments for a sustainable development of the humankind through green economy and performant, but clean technologies. This green economy is based on green energy, green technologies, green business and green industries, that in agriculture led to the success application of the “green revolution” principle elaborated by Norman Borlaug. Today, the green economy is expanding in the European Union and at global level through clean technologies, with green energy produced, for example, through wind turbines and biofuels.

In agriculture industry, the green economy uses different plant types and animal breeds, with high genetic performances in bioconversion of solar energy in vegetal biomass and then, through the food chain from agroecosystems, based on agrobiodiversity, agrifood green power increases through bioconversion of plant biomass in animal origin proteins biomass, including green products obtained in bioreactors.

Blue economy is a new concept released by Gunter Pauli, concept that is based on applying nature’s mechanisms and principles for humankind development. A few principles of this concept, selected by R.S. Serea and A. T. Bogdan, are presented below:

Nature responds to basic needs and then evolves from sufficiency to abundance, while the present economic model relies on scarcity as a basis for production and consumption; Nature only works with what is locally available, because sustainable business evolves with respect not only for local resources, but also for culture and tradition; Nature evolved from few species to a rich biodiversity, wealth meaning diversity, while industrial standardization is the contrary; Natural systems cascade nutrients, matter and energy – waste does not exist and any by-product is the source for a new product; in Nature one process generates multiple benefits, because Nature is efficient, so sustainable business maximizes use of available material and energy, which reduces the unit price for the consumer.

It's obvious the fact that, from these principles, that are correct and real, a part of them are common with the principles of bio-economy established by Nicholas Georgescu-Roegen, and another part, with those of eco-economy, established by Lester R. Brown; also, there are marked differences between the approaching ways from the green economy and blue economy, especially under the aspect of excessive nonrenewable raw materials consumption, thus our group will carry on with this kind of comparative approaches for the benefit of human society development, in conditions of social inclusion and employment positive trend.

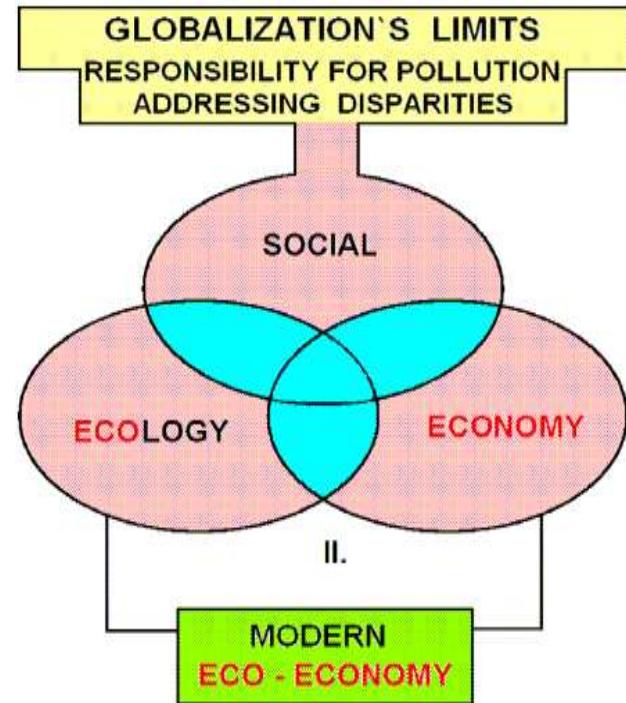
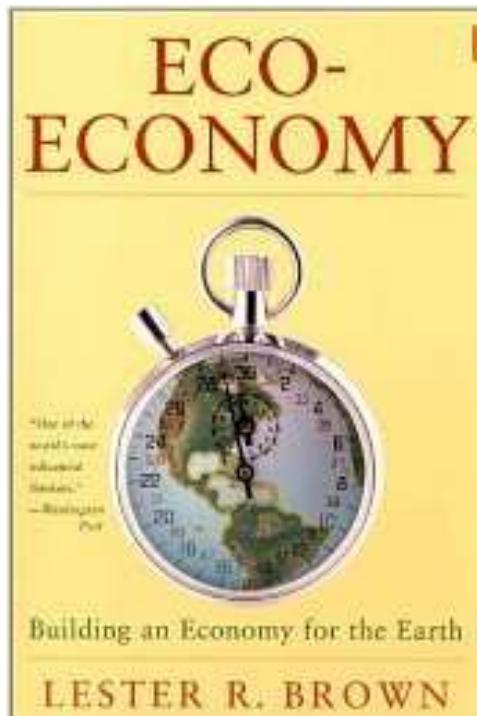


Fig. 13. Remarks for modern eco-economy based on priority terminology using the term "ecoeconomy" from Lester Brown, with social significations of economy (orig. Alexandru T. Bogdan, Dorina Bogdan and Amalia Străeanu, 2007)

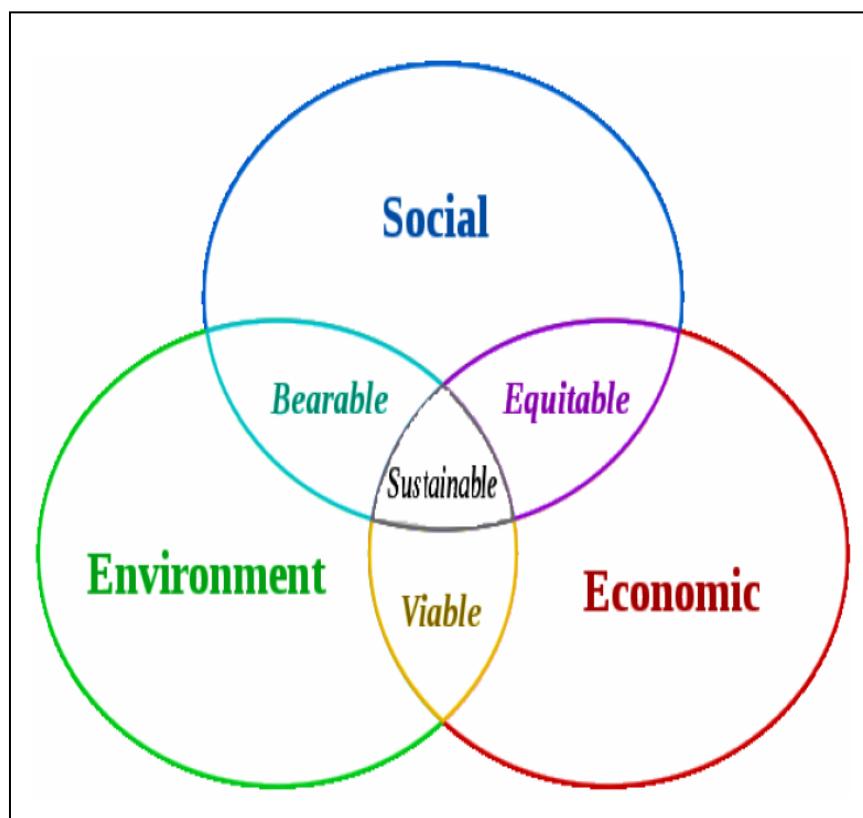


Fig. 14. Lester Brown's diagram for eco-economy paradigm (2001)

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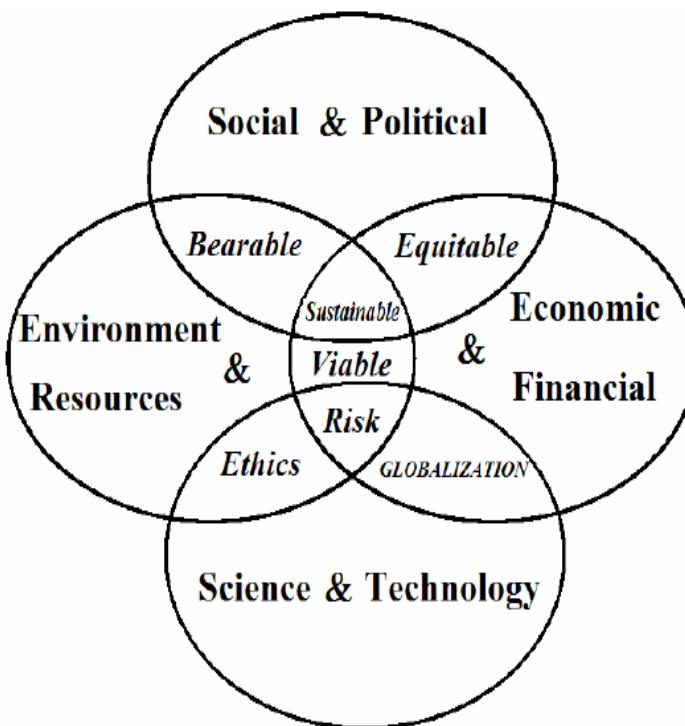


Fig. 15. Modification of Lester Brown's diagram for eco-economics paradigm, considering globalization and economic-financial crisis
(orig. Alexandru T. Bogdan, Dorina Bogdan and Amalia Străeanu, 2007)

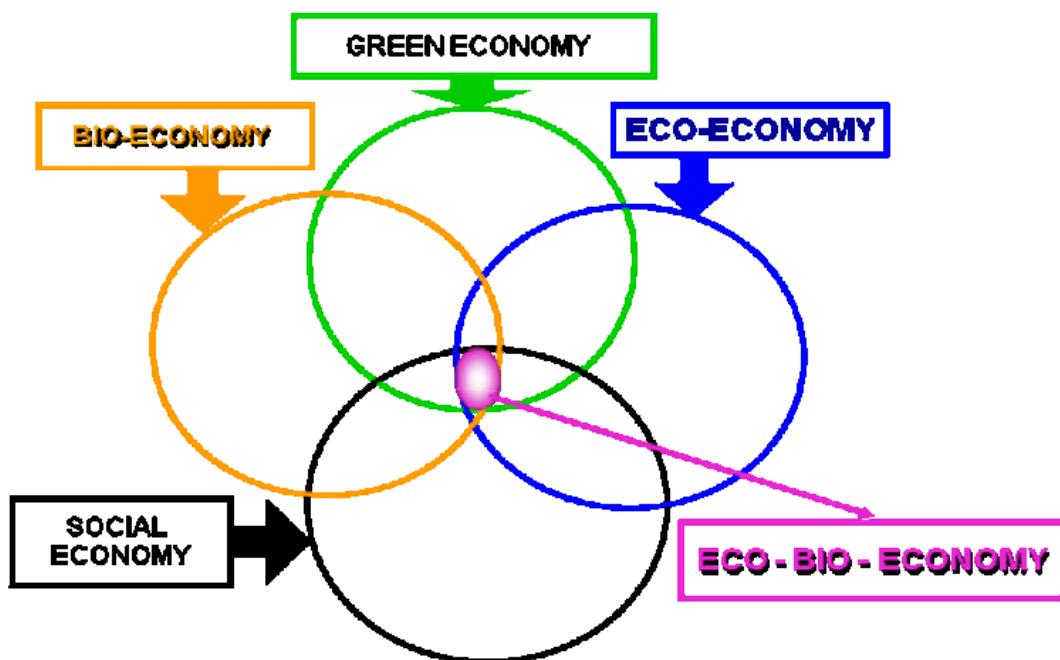


Fig. 16. Complex interrelations between the terms: green economy, ecoeconomy, bioeconomy and social economy, to define the new paradigm "eco-bio-economy" by A.T. Bogdan and our working group (2007-2009), with social significations
(orig. Alexandru T. Bogdan, Dorina Bogdan and Amalia Străeanu, 2009)

In collaboration with colleague Dr. Marcel Matiuti and Prof. Carmen Matiuti, chemical engineer, I was co-author of several works which fall into EU bioeconomy development strategy for the period 2014-2050-2100. The scientific papers presents original concepts and strategies for development in Danube Euroregions and are relating to food safety, food defense (new term for Romania) and the possibility of ecological action of biohazardous forms. The strategies for the development of this region is very important because it values the economic, scientific, historic, environmental and multicultural capital of a population, which forms the territorial capital of the Danubian euro-region. Creating a rural web network is of major importance for rural development. This should facility farmers (including animal breeders), services and information for dissemination of best practices; all this aimed at raising the competitiveness of Danubian Euroregions. Part of the works contain results from the Euroregion of Romanian Banat and Serbian Banat, including comparisons between them using a new science for Romania, ethnozootechny as a component of geoeconomy; were made new concepts ethno-geoeconomy and etnogastronomy. Etnozootenia is the science which studies human-animal-environment relationship, we promoted through several works where we have introduced the new paradigm of eco-bio-geostrategy. The ethnozootechny studies appear in the works for the application of innovative bio-economic strategy Euroregions Carpathien-Danubian-Pontic. In my work I approached the eco-physiological aspects of traditional meat products and milk in Transylvania and Banat.

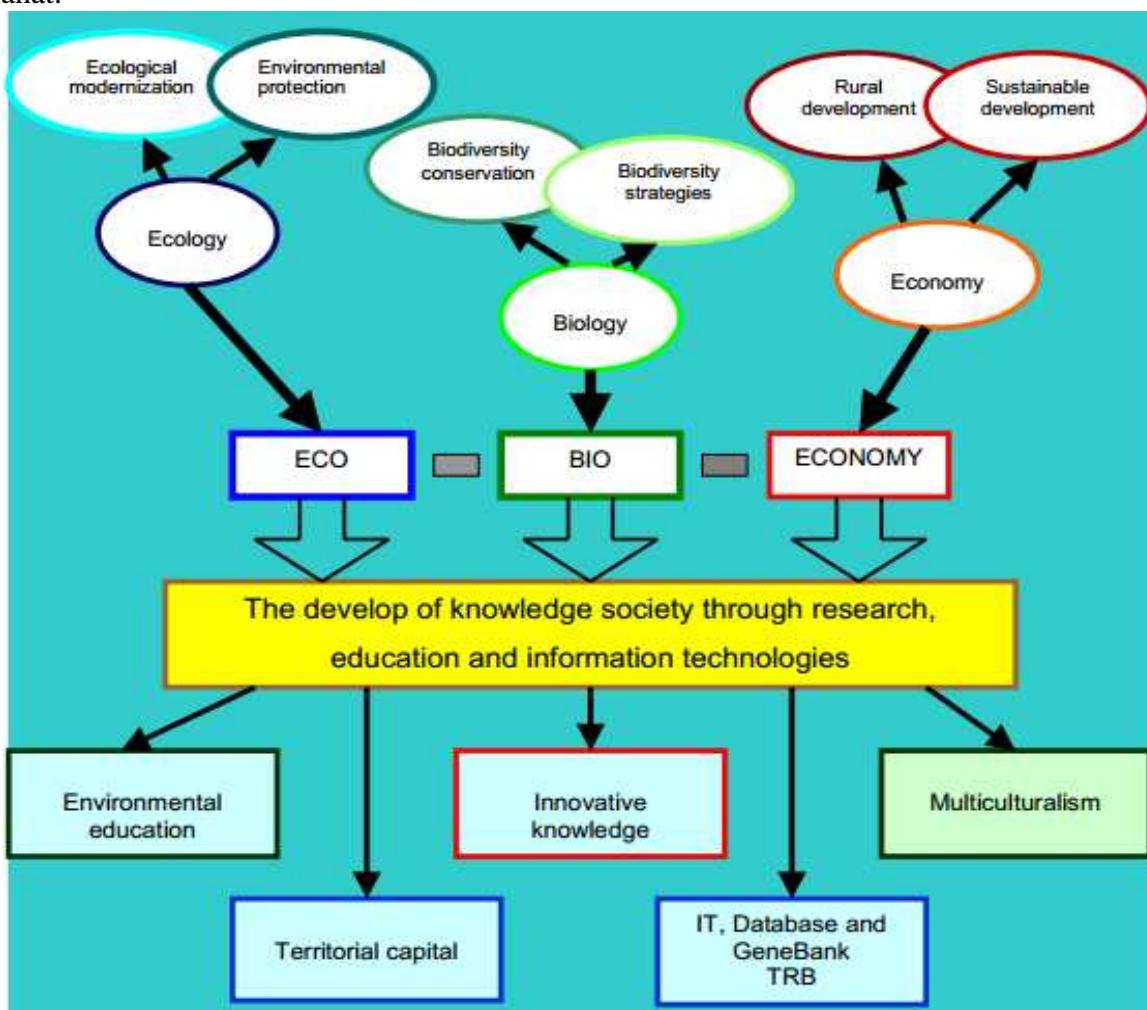


Fig. 17. The development strategy based on a bio-economic cross-link between education, research and innovation
(orig. Marcel Matiuti, Alexandru T. Bogdan, Dorina Bogdan, Carmen Matiuti, 2012)

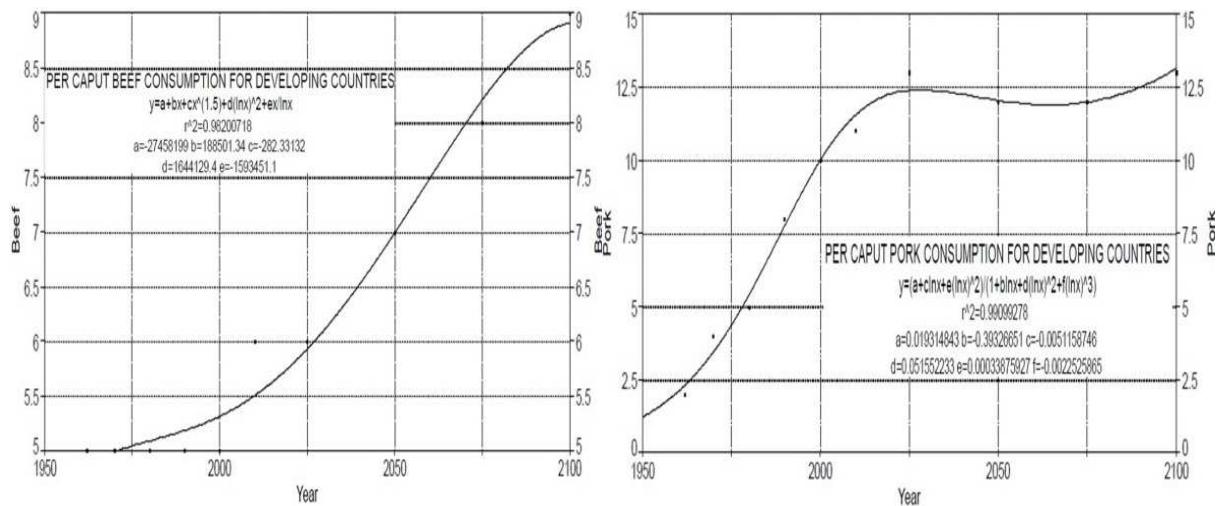


Fig. 18. Regression curve to describe the dynamic of beef and pork consumption for developing countries (correlation calculated by A.T. Bogdan, R. Burlacu, I. Surdu, using database on The State of Food Insecurity in The World, 2004).

Within National Institute of Economical Researches “Costin C. Kiritescu” there is, for many decades, a constant concern for the study and capitalization of the original scientific contributions of romanian origin american scientist Nicholas Georgescu-Roegen, demonstrated through publication, in the last 25 years of 15 volumes from the scientifical opera of the scientist, that have been edited and published under the coordination of Aurel Iancu, Romanian Academy member and professor Ion Valeriu Franc.

The objectives of Horizon 2020 programme, as core part of Europe 2020, Innovation Union & European Research Area are: responding to the economic crisis to invest in future jobs and growth; addressing people’s concerns about their livelihoods, safety and environment; strengthening the EU’s global position in research, innovation and technology.

Tab. 7.
Biotechnologies with a high probability of reaching the market by 2030

Agriculture	Health	Industry
Widespread use of marker assisted selection (MAS) in plant, livestock, fish and shellfish breeding.	Many new pharmaceuticals and vaccines, based in part on biotechnological knowledge, receiving marketing approval each year.	Improved enzymes for a growing range of applications in the chemical sector.
Genetically modified (GM) varieties of major crops and trees with improved starch, oil, and lignin content to improve industrial processing and conversion yields.	Greater use of pharmacogenetics in clinical trials and in prescribing practice, with a fall in the percentage of patients eligible for treatment with a given therapeutic.	Improved micro-organisms that can produce an increasing number of chemical products in one step, some of which build on genes identified through bioprospecting.
GM plants and animals for producing pharmaceuticals and other valuable compounds.	Improved safety and efficacy of therapeutic treatments due to linking pharmacogenetic data, prescribing data, and long-term health outcomes.	Biosensors for real-time monitoring of environmental pollutants and biometrics for identifying people.
Improved varieties of major food and feed crops with higher yield, pest resistance and stress tolerance developed through GM, MAS, intragenics or cisgenesis.	Extensive screening for multiple genetic risk factors for common diseases such as arthritis where genetics is a contributing cause.	High energy-density biofuels produced from sugar cane and cellulosic sources of biomass.
More diagnostics for genetic traits and diseases of livestock, fish and shellfish.	Improved drug delivery systems from convergence between biotechnology and nanotechnology.	Greater market share for biomaterials such as bioplastics, especially in niche areas where they provide some advantage.

Cloning of high-value animal breeding stock.	New nutraceuticals, some of which will be produced by GM micro-organisms and others from plant or marine extracts.	Biotechnological bioindustry based on future GMO technology, produced in animal bioreactors.*
Major staple crops of developing countries enhanced with vitamins or trace nutrients, using GM technology.	Low-cost genetic testing of risk factors for chronic diseases such as arthritis, Type II diabetes, heart disease, and some cancers; regenerative medicine.	Applying in entrepreneurial practical bioindustry of nanotechnologies and picotechnology (10^{12}) research development in academical research areas.*

*Note: This table is presented after The BIOECONOMY to 2030; Designing a Policy Agenda from OECD.



Fig. 19. Synthesis of BIO-ECO-GEO-STRATEGIES
(orig. A.T. Bogdan, Carmen Pasalau & R.S. Serea, 2013).

Main Findings and Policy Conclusions; Health column was modified at the penultimate section by adding “regenerative medicine”, that was taken from the last section, thus being simplified. In the Industry column, in the original table the last 2 sections were uncompleted and now the text introduced with “**” was realized by A.T. Bogdan and R.S. Serea. All this aspects from table no. 1 and 2 are explicated through the content of fig. 5 and 6, that are referring to BIO-ECO-STRATEGIES and BIO-ECO-GEO-ECONOMY.

In this context, Alexandru T. Bogdan, in collaboration with specialists from National Institute of Economical Reserches and Center for Studies and Research of Agroforestry Biodiversity have considered that the synoptic presentation of data forecasting for trends in R&D and jobs and skills dynamic perspective is very useful.

Table 8. Indicative regulatory costs to commercialise a biotechnology product (USD thousands).

Agriculture	
Plant	
GM crop ²	435–13 460
MAS crop ³	5–11
Animal	242–469
Vaccine ⁴	176–329
Therapeutic ⁵	9–189
Diagnostic ⁴	
Health	
Therapeutics ⁶	1 300
<i>In vitro</i> diagnostics ⁷	150–600
Industry	
GM open release ⁸	1 200–3 000
Unknown	
GM in closed loop	

Note: Table 8 is cited from “The Bioeconomy to 2030”, OECD, Paris, 2009. Notes are based on Just *et al.*, 2006. Lower estimates exclude all costs that could be associated with proving environmental or human safety, while higher estimates include such costs. All estimates exclude “facility & management overhead costs”. 3. Figures from the German Bundessortenamt and converted from Euros to USD using the average of monthly exchange rates from June 2005 to September 2008 (1 EUR = USD 1.34). 4. Provided by the USDA Center for Veterinary Biologics. Estimates assume that the applicant already possesses an establishment license. 5. Fiscal year 2008 fees for the FDA from US Federal Register, 2007a. 6. Based on a new drug application requiring clinical data, product fees, and a rough estimate of the costs of production establishment inspections per drug, from US Federal Register 2007b. 7. Fiscal year 2008 fees, based on FDA, 2008. IVDs are classified as medical devices. Lower figure is for businesses with less than USD 100 million in sales. 8. Total costs to industry in first year, in 1995 USD, from EPA, 1997.

The table below is from European Bioeconomy to 2030.

The European bio-economy has an approximate market size of over €1.5 trillion, employing more than 22 million people.

Sector	Annual turnover (billion €)	Employment (million)
Food	800	4.1
Agriculture	210	15
Paper/Pulp	400	0.3 direct (4 ind.)
Forestry/ Wood ind.	150	2.7
Industrial Biotech.	50 (est.)	
Total	1610	22.1

*estimated to be around €100-160 million by 2010;

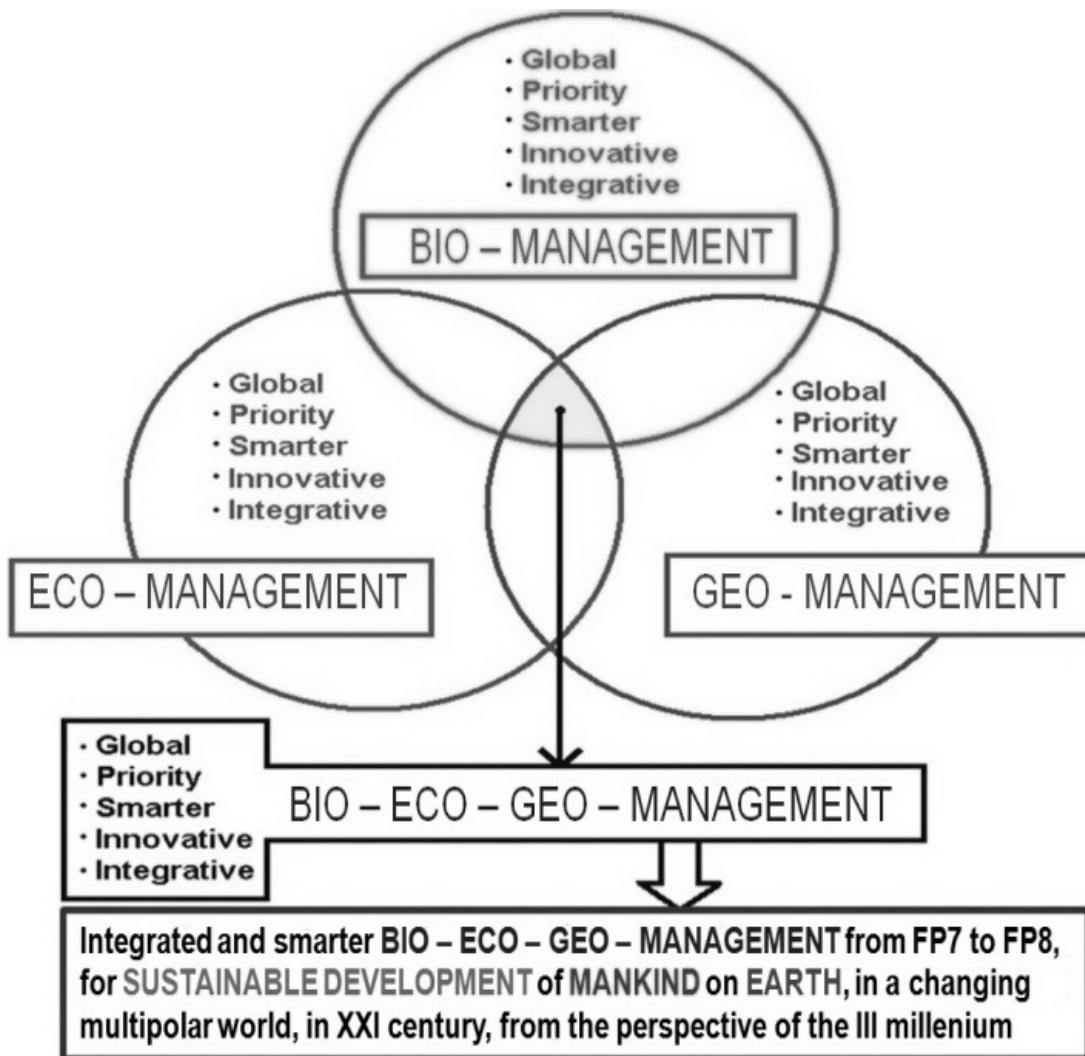


Fig. 20. New concept of Bio-Eco-Geo-Management in relation with european research programme, FP7 and FP8 (orig. A.T. Bogdan et al, 2010; actualized with R.S. Serea, 2014).

A.T. Bogdan in collaboration with the author's group and with prestige specialists from long-term experts nominee in the 2 research POSDRU projects – Postdoctoral and doctoral researches (ID no. 63258, respectively ID no. 77082), funded by European Union from Romania's granted funds in post-adhesion period (2007-2013).

We consider that today, in the context of accelerated developing of bioeconomy at European and global level, including the perspectives guaranteed by ascendant evolution, at least until 2030 (we are convinced that developing will continue until 2050 and until 2100, as we suggested in our previous papers – A.T. Bogdan et al, 2010-2013) exists numerous and varied biotechnologies that, applied correctly, with the strict following of international protection rules of consumers allow passing from "fiat panis" at "habemus panis". So, on the basis of this scientific and technical considerations that are founding BIO-ECO-GEO-ECONOMICS, the affirmation from this article's title, is that in the present we already have the capacity to say "HABEMUS PANIS", in the context of GLOBALISED BIOPOWER *through more agrifood and seafood*, for all world population, with the condition to have the desire of political and governmental factors for bioeconomical applying of scientifical discoveries made through excellence researches, and technological transfer in developing countries that it's necessary and justified.

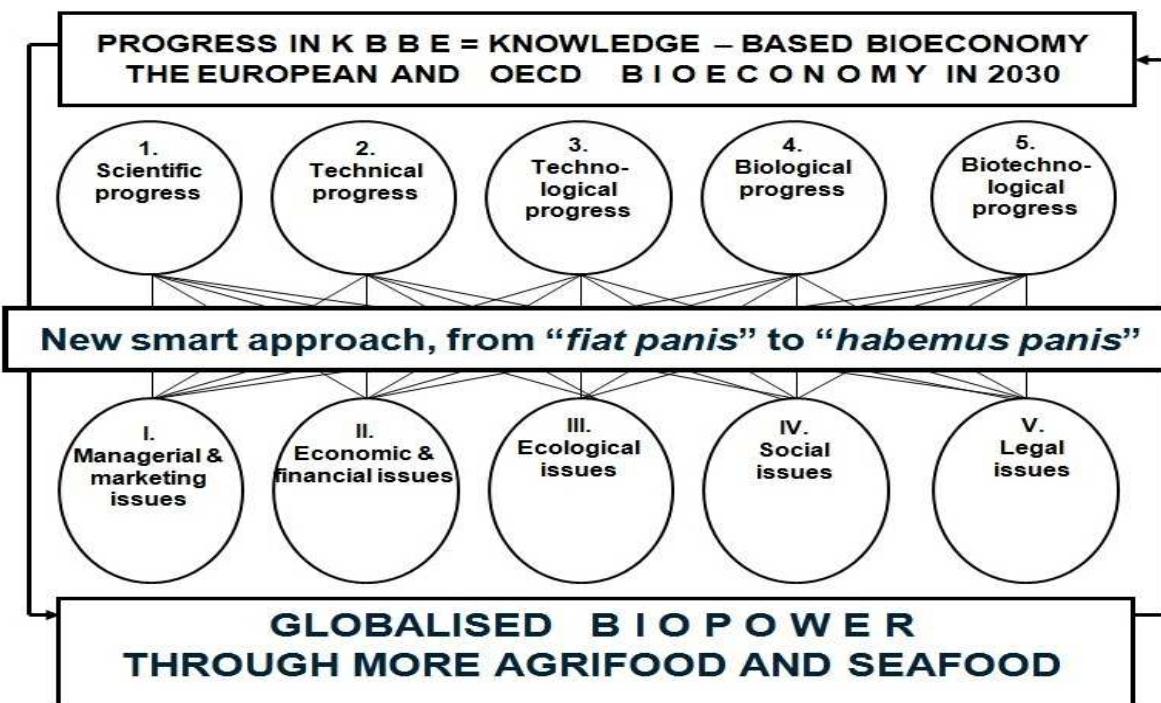


Fig. 21. Applying the principles and objectives of complexity science for resolving through KBBE (Knowledge-Based Bio-Economy) of food bioresources for humankind through innovative BIO-ECO-GEO-STRATEGIES, that will ensure passing from “*fiat panis*” to “HABEMUS PANIS”, respectively realization of globalised biopower through more agrifood and seafood (orig. A. T. Bogdan, Dorina Bogdan, Amalia Strateanu, 2011, with modifications made in collaboration with Carmen Pasalau and R.S. Serea, 2014).

The KBBE will play an important role in a global economy, where knowledge is the best way to increase productivity and competitiveness and improve our quality of life, while protecting our environment and social model. It is a sector estimated to be worth more than € 1.5 trillion per year. KBBE addresses the following needs: growing demand for safer, healthier, higher quality food; sustainable use and production of renewable bio-resources; increasing risk of epizootic and zoonotic diseases and food related disorders; sustainability and security of agricultural, aquaculture and fisheries production; increasing demand for high quality food, taking into account animal welfare and rural and coastal contexts and response to specific dietary needs of consumers.

World bioeconomy, European and National bioeconomy makes real progresses under technical, scientific and socio-economic aspects, already existing at European level, from official statistics of European Comission a total market of 1.610 billion euro/annually and over 22 millions employees, from which, the agrifood sector and industrial biotechnologies goes over 1 trillion euro, this justifying our optimism that humankind has today the possibility of passing from “*fiat panis*” at “HABEMUS PANIS”. On the basis of our own researches made within the scientific thematic approved by Romanian Academy for the National Institute of Economical Researches “Costin C. Kiritescu”, through the specialists and collaborators from the Center for Studies and Researches of Agroforestry Biodiversity, prof. Alexandru T. Bogdan and eng. Dana Comsa propose the understanding of actual and perspective situation, when we entered into a new economy that represents GLOBALISED BIOPOWER through smart and innovative agrifood and seafood, in the context of the new concept of BIO-ECO-GEO-DIPLOMACY, necessary for the protection, capitalization and development of world natural and cultural heritage of humankind.

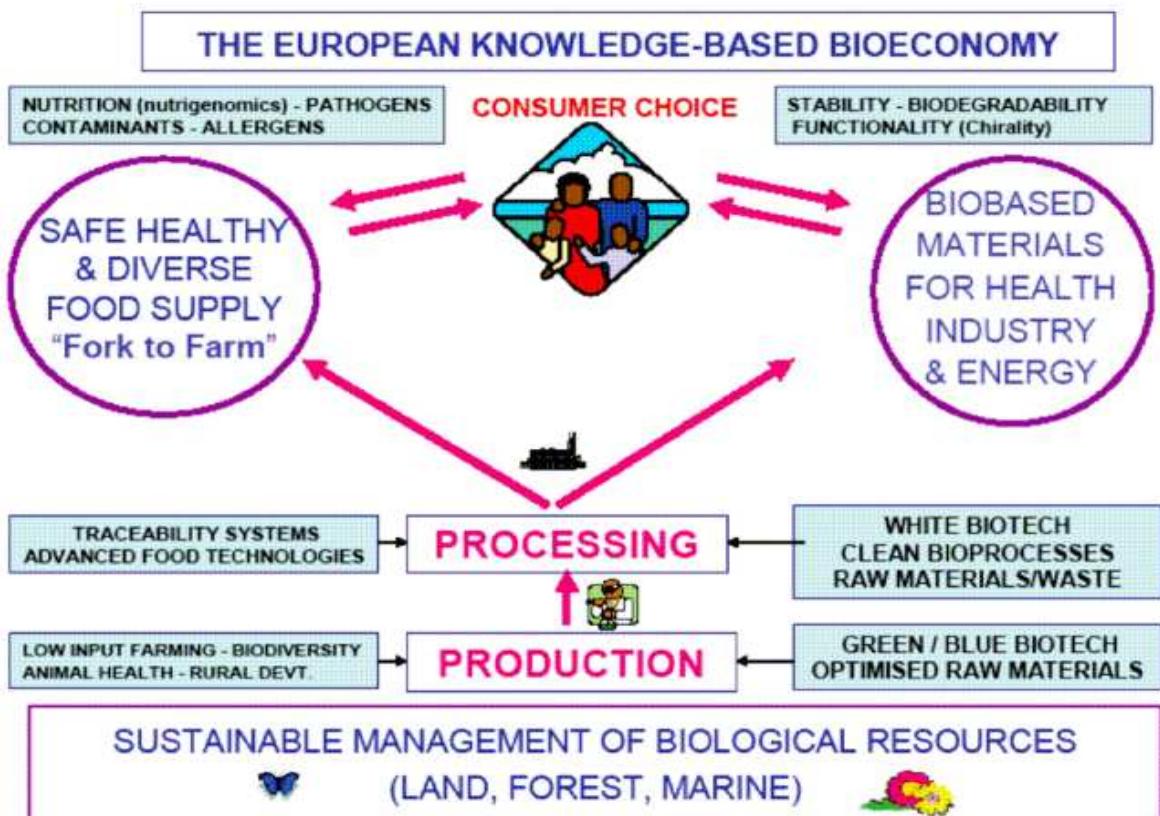


Fig. 22. In this scheme, that became a symbol for European KBBE, I consider that Complex relationships between sustainable management of biological resources (land, forest, marine), on the basis of biodiversity and especially of agricultural, forestry, zootechnical and medical biotechnologies, with a major role in ensuring food bioresources for mankind, only in conditions of consumers protection and feed-back control on traceability of food and feed in anthropic ecosystems (actual aspects, especially after different alerts with problems in food chain; These possible frauds are today verified through molecular genetics methods, as specialists from N.I.E.R. / C.R.S.A.B. study from many years the traceability of food and feed through the method G. Brem and analysed with the support of AgriLab from Germany).

Alexandru T. Bogdan propose that this new economy to include also the capitalization, under dry state, of animal and vegetal food, because when there are periods with rich crops and the market request is low and offer very abundant, the producers from agriculture and aquaculture have a huge loss. If deposits will be made, at regional, national or international level for dry food, that can be utilised in emergency situations, including the years with very low crop production, the loss of producers will be diminished and food security will be ensured for at least a year, based on risk management and biosecurity actions.

New integrated and innovative paradigm about “bio-eco-geo-economy”. The scientific researchers collective, including those recently nominee as associated scientific researchers at the Center for Study and Research of Agroforestry Biodiversity within National Institute of Economical Research of Romanian Academy, after many years and many scientifical papers regarding the original concept/paradigm about eco-bio-economy (in essence an economy based on environmental factors and especially on limited natural resources that are needed for a durable life of actual generations and especially those in the future). In the central square of figure no. 23 posted below, we synthesize the elements of Bio-Eco-Economy, with explications also in figure no. 22.

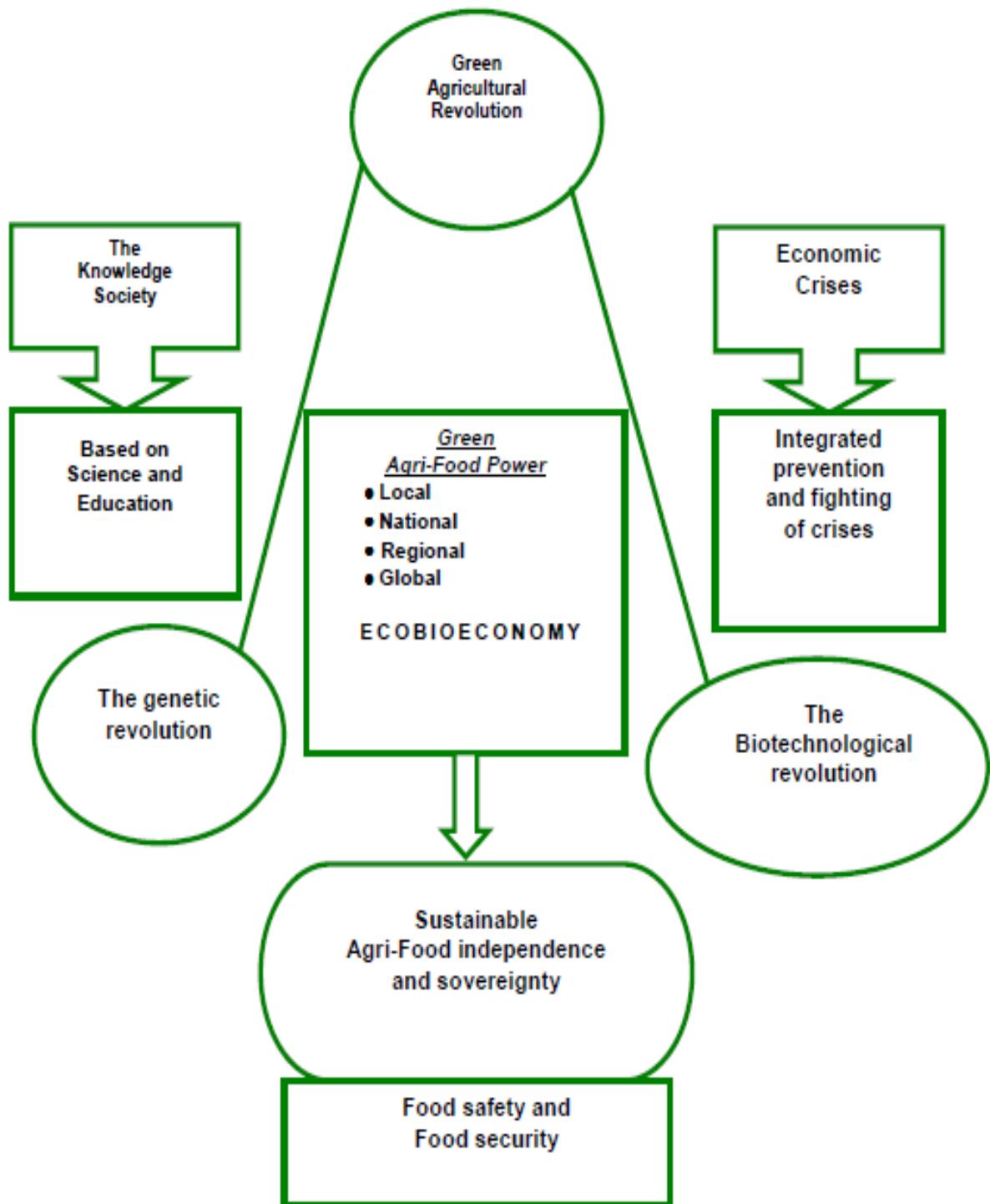


Fig. 23. Innovative use of Complexity Sciences and Innovative Applications for Globalized Interrelations between Green and Blue Agriculture and Aquaculture Revolutions, in the context of Knowledge Society and Genetic, Genomics and Proteomics Revolutions, with Integrated Prevention and fighting of Economic and Financial Crisis for Biotechnological and Bioindustrial Revolutions, based on Reshaping the Sustainable Agri-Aqua-Food Independence and Sovereignty, through smart Bio-Eco-Geo-Economics, that will achieve Food Safety, Security and Defense (orig. A.T. Bogdan, Dorina Bogdan, Denis L. Diaconescu, S. Chelmu and Amalia Strateanu, 2009; modified by A.T. Bogdan, N. Istudor, N. Bulz, I. Gaf-Deac, S. Chelmu, I. Prica, C. Sonea, R.S. Serea and Carmen Pasalau, 2013).

These new innovative approaches of our group start from the fact that the biogeochemical cycles are based on bio-eco-geo-entropy for life survival and sustainability in anthropic ecosystems (fig. 24). This image explains Georgescu-Roegen's ideas about thermodynamic laws in generally, and especially about entalpy and entropy, respectively the scientific foundation of his bioeconomical theory. Looking at this image, with a butterfly on a flower from the globalized ecosystem's biota, Alexandru T. Bogdan, in collaboration with specialists from National Institute of Economical Reserches and Center for Studies and Research of Agroforestry Biodiversity, in collaboration with the young biologist Radu-Sorin Serea from the Ecological Society "Aquaterra", have discussed about the well-known expression referring to the fact that "something as small as the flutter of a butterfly's wing can ultimately cause a typhoon halfway around the world" (this is today's reality of the globally and glocally interconnected world, with unpredictable actions of *chaordic systems* principles).

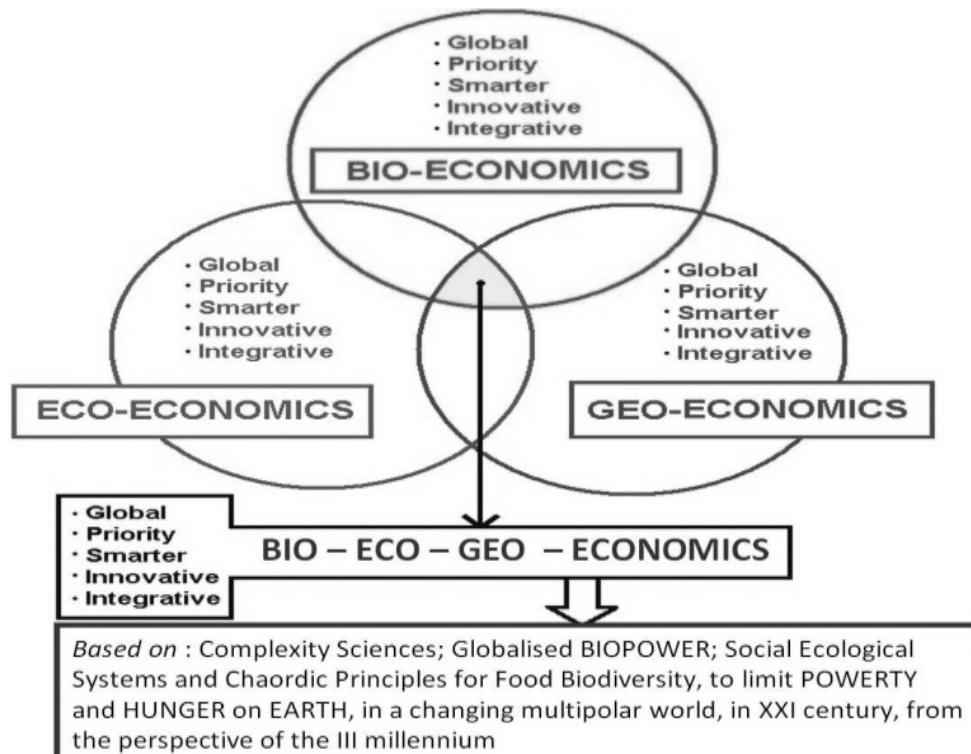


Fig. 24. Global, Prioritary, Smarter, Innovative and Integrative - principal characteristics of BIO – ECO – GEO – ECONOMICS triade, to limit POVERTY and HUNGER on EARTH in a changing multipolar world, in the XXI century from the perspective of the III Millennium, for practical bridging from the green economy to blue economy, in the context of reshaping the world's economy (orig. A.T. Bogdan, Dorina Bogdan and Amalia Strateanu, 2013; modified by A.T. Bogdan, N. Istudor, C. Sonea, R.S. Serea and Carmen Pasalau, 2013).

Scientifical basis of bio – eco – geo – economics. In a synoptic way, in the figure 25 and 26, the complex role of science and technology in the modern, globalized society is presented, highlighting some particularities that resulted from the activity of our group of specialists and associated scientifical researchers Alexandru T. Bogdan, in collaboration with specialists from National Institute of Economical Reserches and Center for Studies and Research of Agroforestry Biodiversity (from N.I.E.R. / C.S.R.A.B.), during activities progress from our annual thematic plans 2007-2013, refering to new theoretical and practical approaches on the impact of bioeconomy and ecoeconomy in the actual context of multiple and simultaneous crisis.

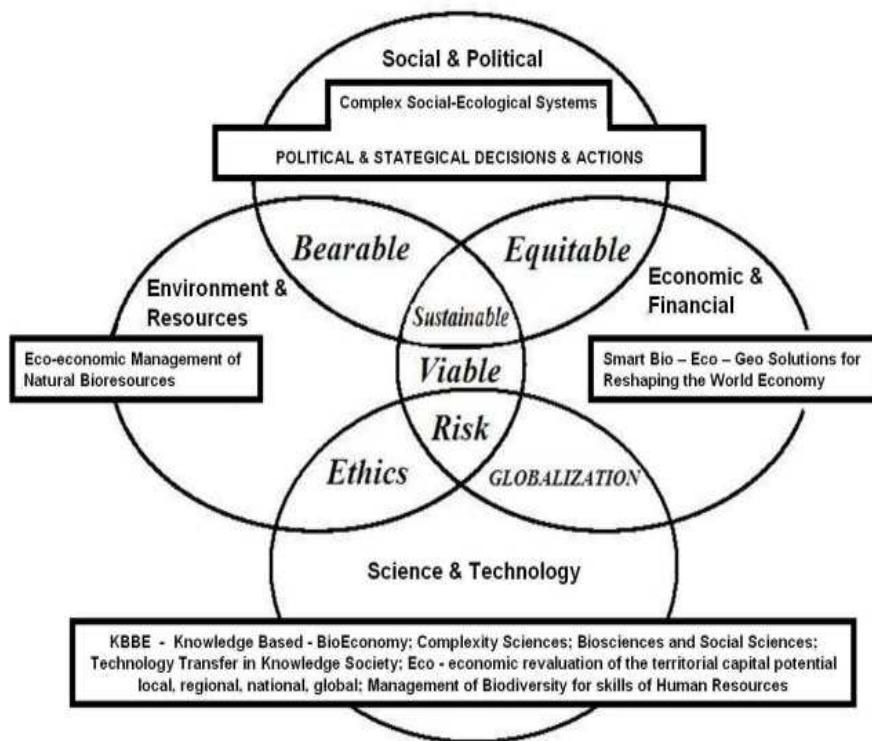


Fig. 25 Modifications and completions of the initial scheme used by Lester R. Brown, based on a triade of determining factors in the practical realisation of the benefits from eco-economy, in the actual and perspective context of holistic bio-eco-geo-economic approaches, underlining the role of life sciences and that of social - ecological system complex (after A. T. Bogdan, N. Istudor, N. Bulz, Dorina Bogdan, G. F. Toba, Denis L. Diaconescu, I. Prica, Amalia Strateanu, R. S. Serea, C. Sonea, Carmen Pasalau, 2013).

The special importance of scientific research in knowing and applying innovative strategies in bioeconomy at local, regional, national and global level is highlighted through the fact that, in the FP7 program and further, in FP8 program, an more and more important focus is on the new paradigms of ecoeconomy, bioeconomy and eco-bio-economy (fig. 26).

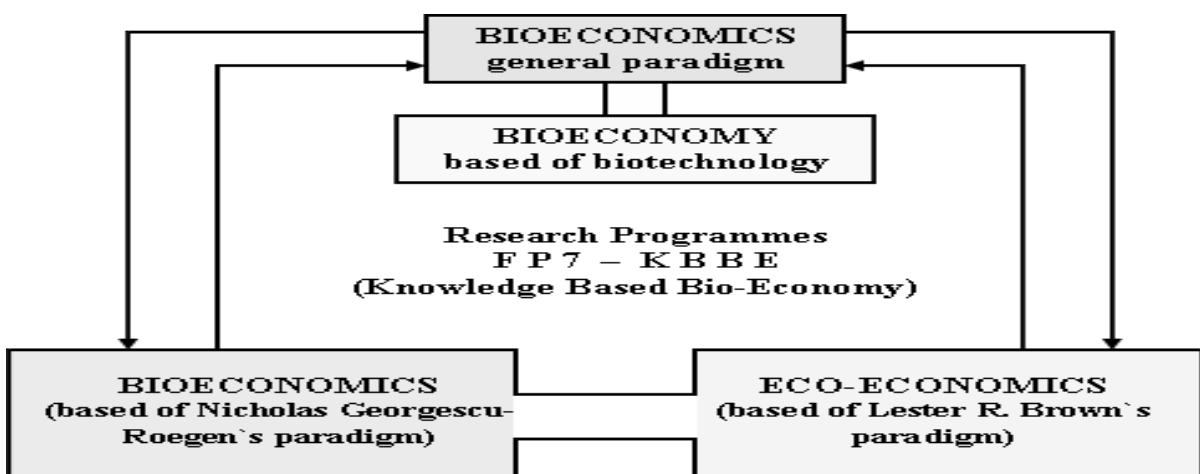


Fig.26 Schematic presentation of the links between research programme FP7, referring to KBBE = Knowledge-Based Bio-Economy, including the relationships between bioeconomy and biotechnology (orig. A.T. Bogdan et al., 2009).

These scientifical approaches, combined under the name KBBE continue also for the period 2014-2020, such that already exist in progress more project proposals for scientifical research, competitively funded by the European Union, proposals that our group from N.I.E.R. / C.S.R.A.B. is structuring into the next 3 national and priority megaprojects:

- bioeconomical capitalization of natural resources potential from the national, territorial Carpathian-Danubian and Pontic capital, in collaboration with prestige specialists from the Danube riveran countries, inclusively from the eco-area of European Carpathians and coastal areas of the Black Sea;
- implementation of pertinent proposal from the text of "National Strategic Framework for Sustainable Development of Agro-food Sector and Rural Space in the period 2014-2020-2030", elaborated by a Presidential Committee (in which are part several members of the Romanian Academy, in collaboration with university teachers, representatives of professional associations from agriculture and performance farmers) in the context of global food crisis and constant growth of food needs of humankind;
- integrated bio-eco-geo- approach of interdependence between main ecological factors in their dynamics, modified through pollution actions and biodiversity decrease, consecutive to unfavorable anthropic actions, respectively the elaboration and implementation of some integrated projects, with concrete measures of technoprophylaxis, especially for prevention and fighting anthropogenic pollution.

This new time horizon that already prefigured the advance with at least another decade, respectively 2030, the fierce competition at world level, under the aspect of excellence scientific researches, road openers, through the originality of approaches, data gathering and, especially, elaboration of new studies and prognosis, based on the progress of life sciences, but also on some unfavorable consequences, due to destructive actions on long and very long term, actions conducted, unfortunately, by people with a low ecological and civic education.

Practical applications of bioeconomy in the specific biomass for agri-aqua-food. In the 2 principal papers for projection of bioeconomy development strategies in the European Union and in OECD countries until the year 2030, there are numerous and varied examples of vegetal biomass conversion (respectively the feed) into animal biomass (respectively milk, meat and eggs). In this respect, in figure 8 the global dynamic for milk production, forecasted for the year 2040 is presented and we can observe a permanent increase of this index.

This is why, we also have to have in our country real prognoses regarding bioeconomic dynamic of milk production. Thus, we consider that the potential production of milk biomass is, for Romania, of at least 125.000 hectoliters, respectively a potential production of cow milk for internal consumption of at least 65.000 hectoliters and the difference of 60.000 hectoliters represents the real disponibilities for export.

This milk biomass, consecutive to bioeconomic approach of milk cow growth is obtained from cattle effectives of which potential is at least 7 millions heads; if Romania would have as indicator the degree of quantitative intensification of milk cows effectives from Switzerland, from Netherland and from Denmark then, the source effective of pregnant cows and calved cows from Romania, has to be over 3.5 million heads.

Unfortunately, the dramatic decrease, both under quantitative and qualitative aspects of cattle effectives from Romania, to only a quarter from the potential number mentioned, proves indubitable the fact that bioeconomy is a real opportunity for sustainable development of agrofood sector, like the green power, respectively a biopower, especially in the perspective of a substantial increase of the demand for dairy products and their derivates.

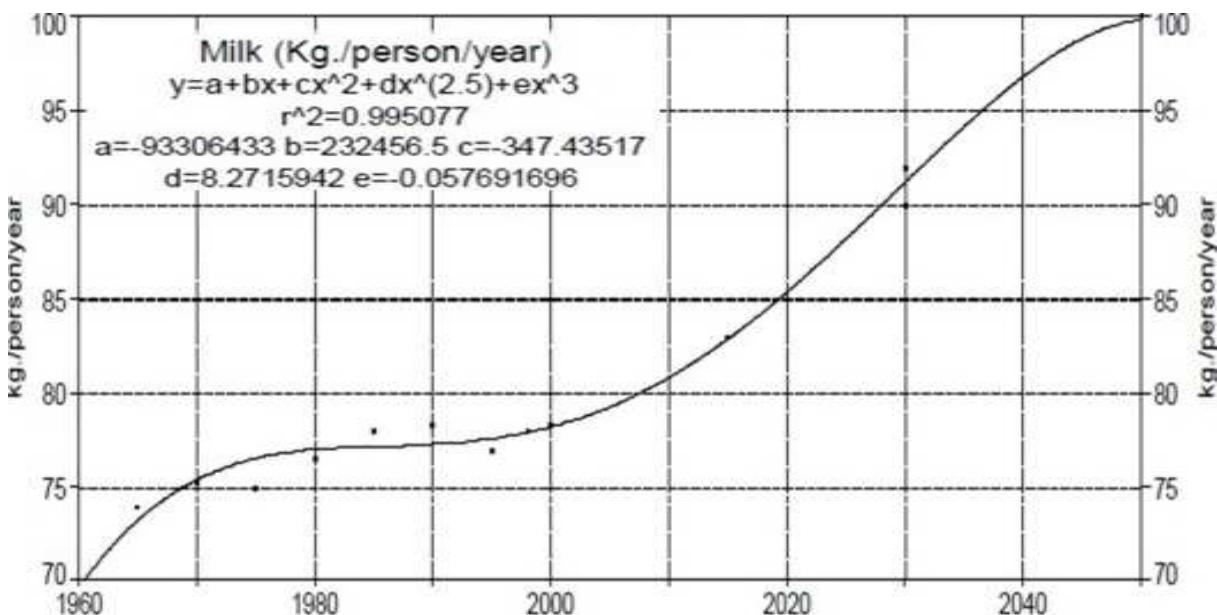


Fig. 27 Milk dynamic production in the period 1960-2040; calculations made by A.T. Bogdan, R. Burlacu and I. Surdu, on the basis of figures published by specialised organisms of ONU and FAO.

Through the versatility of speciality professional training of the author's of this scientific article, our group from National Institute of Economical Researches / Center for Study and Researches of Agroforestry Biodiversity, within the topics of scientific research has statistically processed calculations regarding also other animal species from romanian zootechny, as from other agricultural production areas, vegetal and animal, as for example: from aquaculture, fish culture, aquaponics, permaculture, vegetable culture in green houses and solarium,

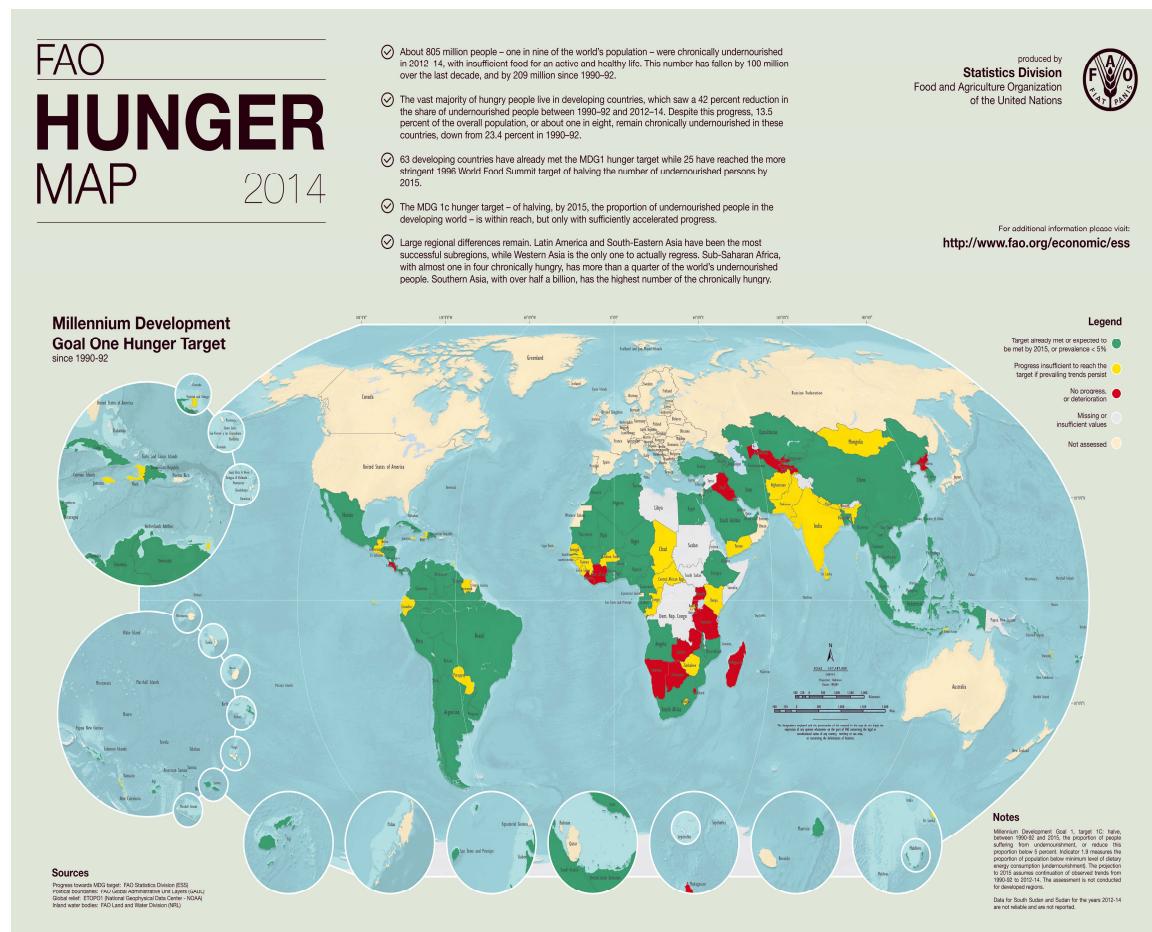
It is obvious, both from international and national speciality literature, and also from our group researches, that the agrifood bioeconomy, especially in her integrating form of agro-aqua-food (or agro-sea-food), represents today a major concern in what is named "The Reshaping of the World:Consequences for Society, Politics and Business", the title in which the World Economic Forum will be held in Davos, Switzerland, in January 2014.

This is why, our extended group, with prestige specialists from the romanian academical environment propose further another national, strategical and prioritary megaproject, that will target the 2020 Horizon, the real ensuring of agro-sea-food independence and sovereignty for Romania's population and some disponibilities for export. These proposals are made on the basis of our participation at Global Agriculture Forum, that is organized annually, in January, at Berlin, with massive world representation, the participation at World Economic Forum, also organized annually in January, at Davos (Switzerland), as exchanges of "good practices" developed within the 2 POSDRU projects (doctoral and postdoctoral researches), competitively funded by European Union and won through National Institute of Economic Researches / Center for Researches and Study of Agroforestry Biodiversity, with scientifical research thematic in bioeconomy and ecoeconomy of food and feed safety and security. These projects have been conducted in good conditions, with the permanent professional support of National Institute of Economic Researches.

At the end of this subchapter are presented forward a synoptic sketch regarding the holistic decalogue of bio-eco-geo-paradigms proposed by A.T. Bogdan et al., for research and study in the period 2014-2016.

The cellular and metabolic homeostasis is projected in ecosystems through the state of climax specifically for complex food chains and for a richness of vegetal and animal biodiversity, thus the eternal nature, through her self regulation and perpetuation mechanisms it offers the most efficient and durable examples of energetic conversion at low entropy, namely through intelligent bio-eco-geo-economical strategies, we can still balance and re-ecologize the anthropic ecosystems, until it becomes an irreversible global process, thus integrating the principles of bio-eco-geo-economy in the dynamic of food chains, with dystrophic modifications specific for ecopathology, from cell apoptosis to economical apoptosis remaining one single step!...

We have to realise very fast and definitive, at global level, the reconciliation of humans with nature, the rational construction of a durable and fair partnership between humans and nature, thus the green economy and, especially the green agrifood biopower to develop, this thing leading at rethinking of production and distribution systems of food, uniformly at world level, in a mechanism with profound implications in managing our planet's resources, including through intelligent use of blue economy, thus avoiding the increase of ecological debt of actual generations from the "accounts" of natural resources necessary for the sustainable survival of future generations, because "living on debt" led to the globalised economical and financial crisis from the last years and major social and ecological conflicts.

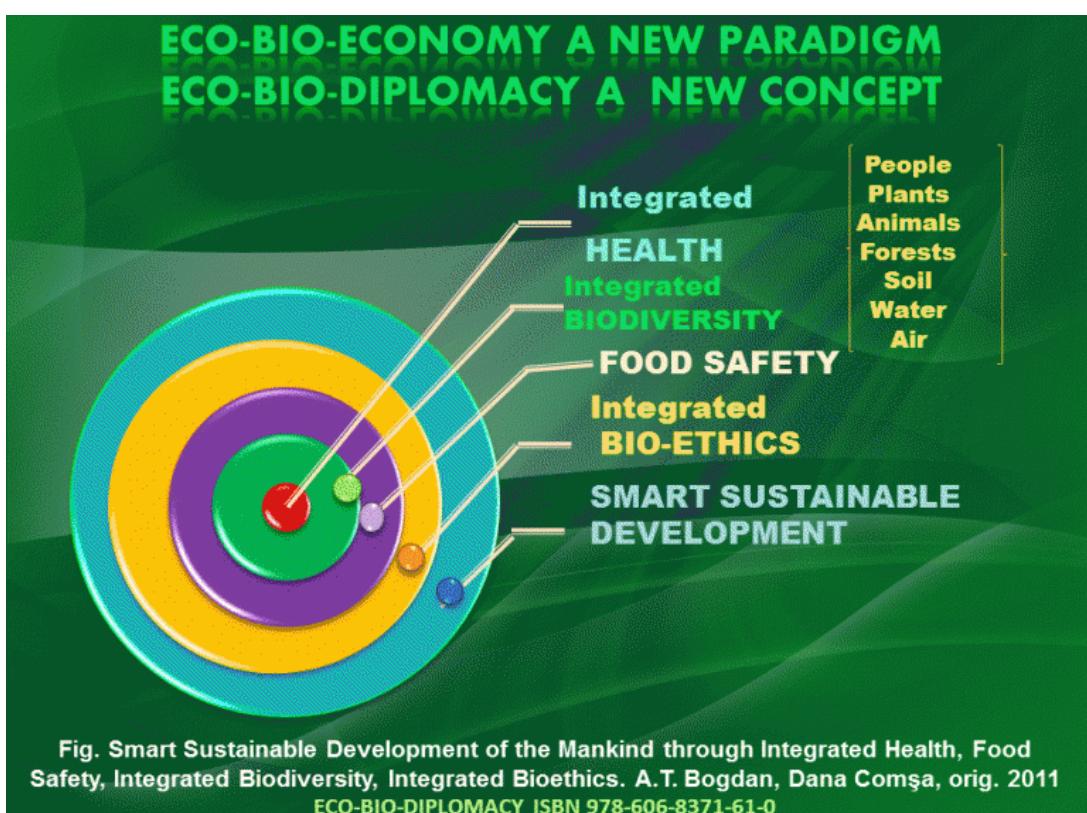


SECTION II

After the presentation of my PhD thesis in veterinary medicine in 1971 I won a scholarship through international competition of 12 months (with possibility of extension for another 12 months) from the known world renowned foundation Alexander von Humboldt in veterinary medicine (I was the first winner of the international scholarships in veterinary medicine in Romania in the period after 1948).

Initially I started this scholarship only for three months, respectively September to November 1971 and has been approved to continuing only after 20 years respectively after the Romanian Revolution of December 1989 (I continued this scholarship, at special invitation of the Humboldt Foundation leadership done in 1990, because it was unique in the long history of several thousand Humboldt scholars worldwide) who were in the Annals of the Foundation, who have not completed the stage of international scientific research.

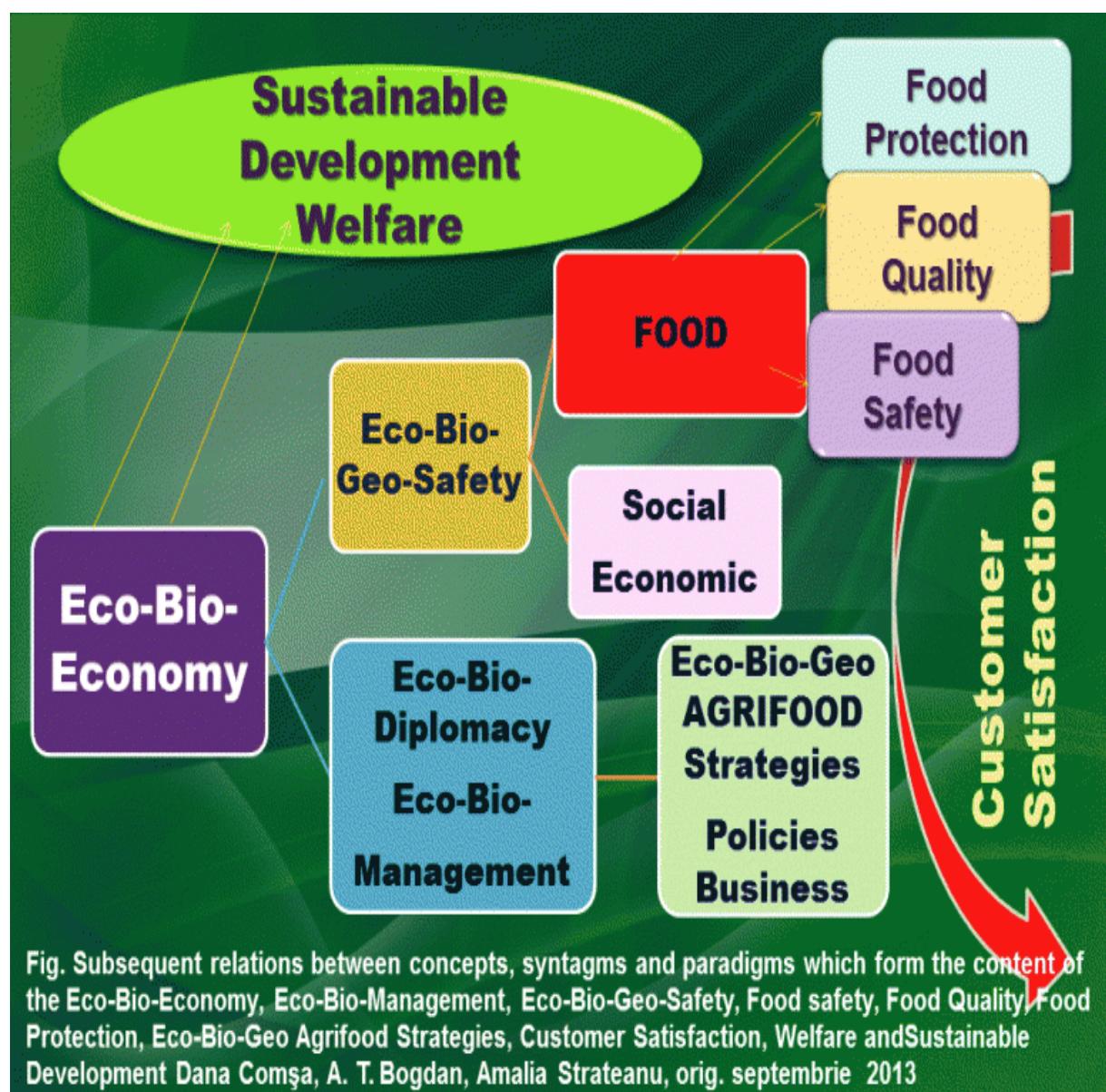
During the period 1990-1992 I have officially completed this important original scientific research, based on the latest research with computerized bioluminescence (precision of picotechnology, namely 10^{-12}) about the metabolism of oocytes and zygotes fertilized in vitro, with computerized videomicrophotometry. These researches are out of date even now after 20 years of making their. I mention that recently in 2010 at Humboldt College I had the work in collaboration with Marcel Matiuti, about new paradigm Eco-Bio-Economy.

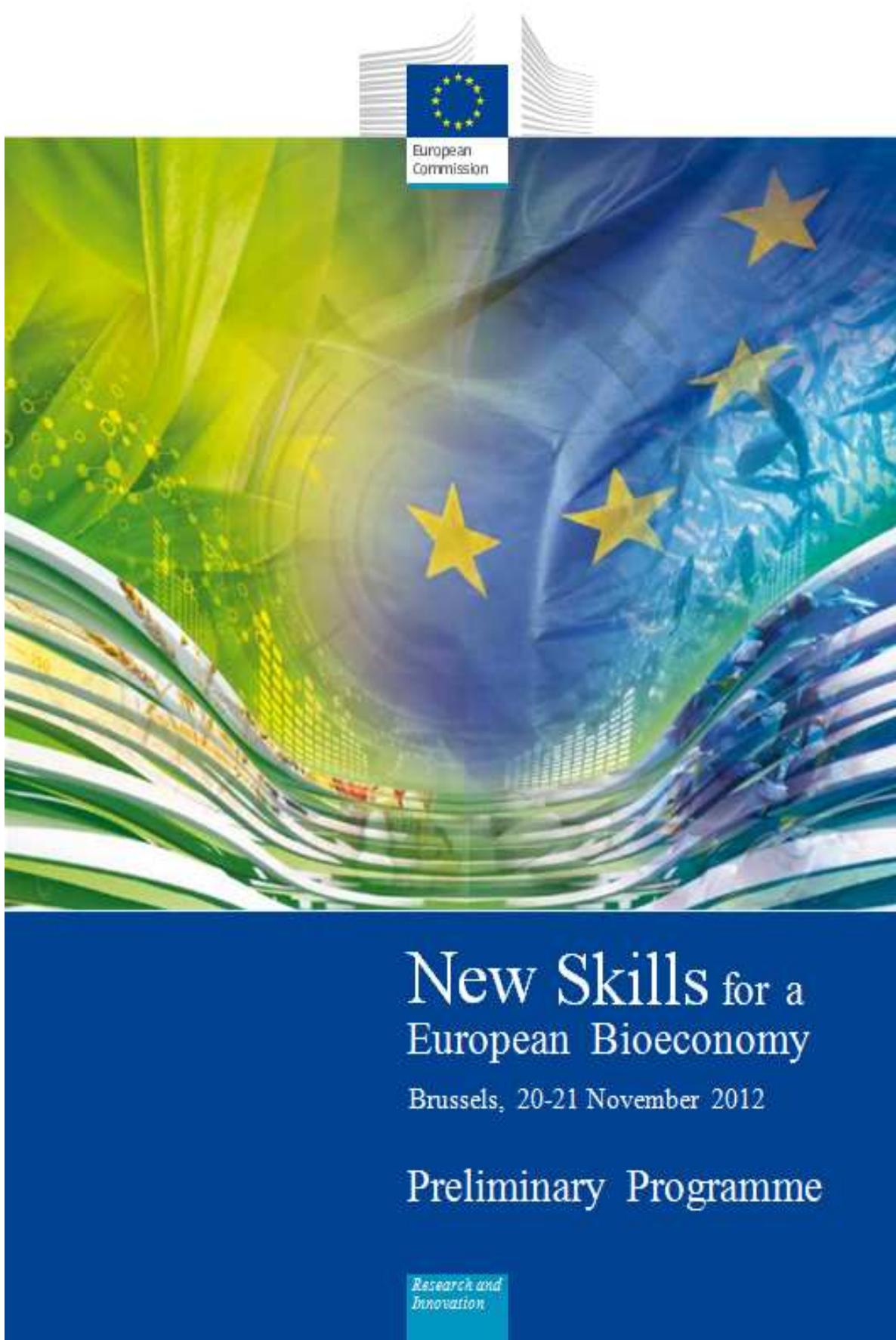


In this Section, I present the evolution and development plans for my further career, after over 53 years since my first scientific paper and more than 43 years after confirmation of the first doctorate in science, because I am looking optimistically into the future (based on the average age of over 83 years now members of the Romanian Academy, part of which has already reached over 90 years and still have working professional, scientific and academic).

In the Second Section, I present my plans for the future, them I forecasted on their triple size in professional, scientific and academic, so the main directions of scientific research are continuing on biosciences veterinary medical and compared, through strategies for eco-bio-geo-cosmo-economics glocalize solutions needed to prevent and combating poverty, hunger, social exclusion and food insecurity, through paradigms and paradoxes of the new concept of "one medicine" approach using smarter technologies advanced studies and research in biodiversity genomics and traceability, in the natural bioresources food, multifunctional, transgenic and biostimulation, in a changing multipolar world of the twenty-first century.

Progress plans and development of my career in the university area/space for over half a century, is based on the directions of teaching at the excellence level for the Doctoral and Postdoctoral School for Bioeconomics Veterinary Medicine of Romanian Academy, with New Sliles for European Bioeconomy bazed on preliminary conference from 20-21 november 2012, Bruxelles (p.38). I wish that all these academic courses to be doubled in the directions of practical applications, the technology transfer in animals farm and food bioindustry for sustainable development welfare, based on successful partnerships and consortiums with innovative SMEs.





New Skills for a European Bioeconomy

Brussels, 20-21 November 2012

Preliminary Programme

Research and
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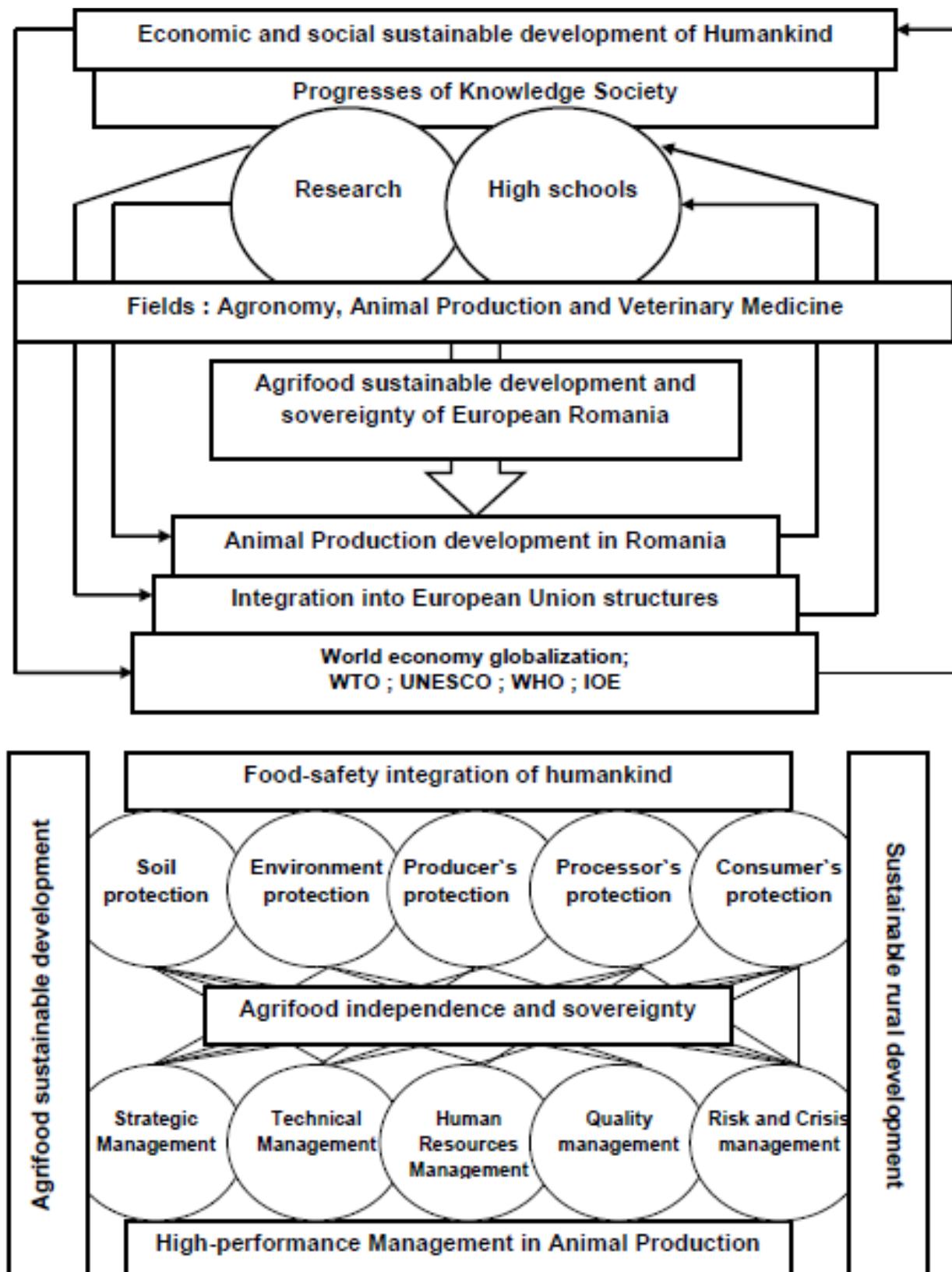


Fig. 28. The complex nature of the principles, targets and consequences for the concepts of agrifood independence and sovereignty, based on more animal production (orig. Alexandru T. Bogdan, Dorina Bogdan and Amalia Străeanu - 2007)



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Scientific Bases for Natural Resources Patrimony – Costs and Benefits of Capitalisation

- Prof. dr. h.c. Alexandru BOGDAN, Director of the „Acad. David Davidescu” Centre for Studies and Research on Agricultural and Forest Biodiversity
- PhD student Amalia-Gianina STRĂTEANU, Centre for Study and Research in Agricultural and Forestry Biodiversity.

Section 2. Natural resources patrimony-Costs and benefits of capitalisation

The Romanian Academy House, Calea 13 Septembrie no. 13, The Meeting Room of the Centre for Studies and Research on Agricultural and Forest Biodiversity, West Wing, Seventh Floor - Friday, November 14, 2014

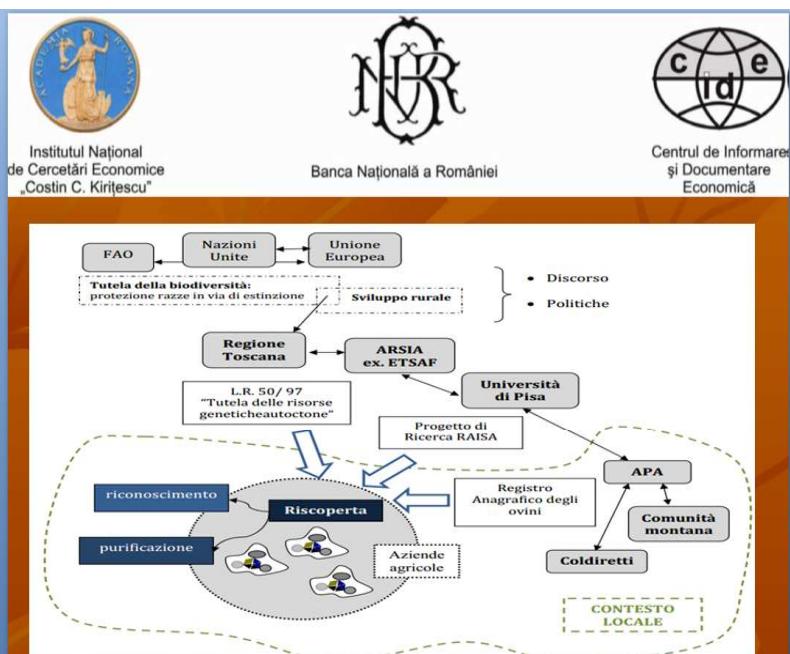
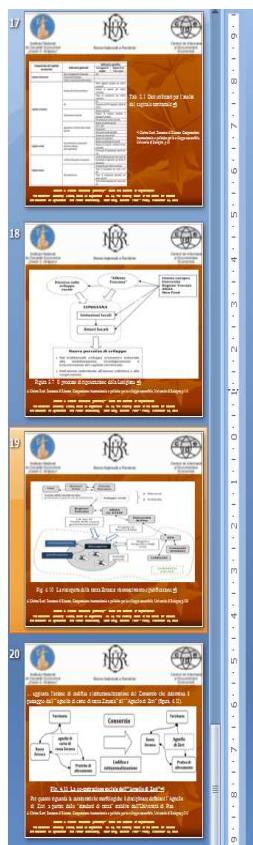


Fig. 4.10 La riscoperta della razza Zerasca: riconoscimento e purificazione *)

* Giaime Berti, Dottorato di Ricerca, Cooperazione internazionale e politiche per lo sviluppo sostenibile, Università di Bologna, p.198

Section 2. Natural resources patrimony-Costs and benefits of capitalisation
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SECTION III

SCINTIFIC PAPERS LIST AFTER OBTAINED SCIENTIFIC TITLE OF "DOCTOR OF VETERINARY MEDECINE" (1971)¹

I. Books published and selected by the scientific title of "Doctor of Veterinary Medecine" (1971)

1. Bogdan A.T. – coordonator; autori: A.T. BOGDAN, Iudith Ipate, G.Fl. Tobă, Simona Ivana, M.Matiuți, D.Diaconescu; *Biodiversity of farm animals and eco-bio-economics significances in the food security context*, Editura Academiei Române, 21.05.2012, București, ISBN 978-973-27-2183-4.
2. Bogdan A.T. – coordonator, autori: A.T. Bogdan, Iudith Ipate, G.Fl. Tobă, Simona Ivana, M. Matiuți, D. Diaconescu, Romanian Academy, "Acad. David Davidescu" Center of Studies and Researches for agroforestry Biodiversity (2012), *Biodiversity of farm animals and eco-bio-economics significances in the food security context*, Second Edition - Vol. I', Editura Academiei Române, București, 15.11.2012, ISBN 978-973-27-2259-6 și Vol. I 978-973-27-2260-2.
3. Bogdan A.T. – coordonator, Second Edition - Volume II, Edite by: A. Ardelean, G. Predoi, G.Fl. Tobă; autori: Iudith Ipate, G.Fl. Tobă, Maria Duca, G. Predoi, Al. Șonea, N. Cornilă, L. Ioniță, Simona Ivana, S. Chelmu, Violeta Simion, Delia Costache, Adriana Pertuș; *Biodiversity of farm animals and eco-bio-economics significances in the food security context*, Editura Academiei Române, Vol.II, 29.11.2012, ISBN 978-973-27-2259-6, Vol.II-ISBN978-973-27-2261-9 București.
4. Bogdan A.T. – coordonator; autori: A.T. Bogdan, Iudith Ipate, G.Fl. Tobă, D. Diaconescu, *Agroforestry biodiversity and eco-bio-economic significances in corelation with food securiry*, Editura Academiei Române, 17.05.2012, București, ISBN 978-973-27-2183-4.
5. AT Bogdan, Ipate Iudith, *Ecoeconomy and ecosanogenesis in Romania based of agrifood green power*, Romanian Academy Editor 2012, ISBN 978-973-27-2264-0
6. AT Bogdan, Constantin Oprean, Letiția Oprean, *Managementul integrat și strategic al combaterii inteligeante a crizei alimentare globale, bazat pe bioeconomie și ecoeconomie*, Editura Academiei Române, 2012, București, ISBN 978-973-27-2266-4.
7. Bogdan A.T., G.Fl. Tobă, Iudith Ipate, D. Diaconescu, Dana Comşa: *Soluții ecobioeconomice bazate pe biodiversitatea agrosilvică pentru asigurarea independenței și suveranității agroalimentare durabile a româniei europene și euroatlantice, (cu semnificații economice ale sănătății integrate a mediului și bioeconomice ale protecției complexe a consumatorilor)*, Ediția a II-a, revizuită și completată, Editura Libris Danubiu, 22 aprilie 2012, ISBN 978-606-928-29-0-8.
8. A.T. Bogdan, Ipate Iudith, Covaci Brândușa (2013), *Innovation activities in biodiversity and eco-bio-economics doctoral research for safety and food security*, Editura Economica, ISBN 978-973-709-672-2.
9. A.T. Bogdan, Ipate Iudith, Covaci Brândușa (2013), *Innovation activities in juridical science for sustaining environment, safety and food security, biotechnology and eco-economy trough doctoral research*, Editura Economica, ISBN 978-973-709-674-6.

¹ Title of PhD thesis: "Research on the relations between the uterus and corpus luteum function in the cow" (1971); doctoral PHD Univ. Emeritus, Dr. Doc Nicolae GLUHOVSCHI; supported in Timisoara Agronomic Institute (since 1990 = USAMV of Banat Timișoara)

10. A.T. Bogdan, Istrate Iudith, Covaci Brândușa (2013), *Innovation activities in dental medicine doctoral research in order to sustain bioeconomy and biodiversity desiderata*, Editura Economică, ISBN 978-973-709-675-3.
11. A.T. Bogdan, Istrate Iudith, Covaci Brândușa (2013), *Solutii inter-multi-disciplinare în contextual strategiilor ecoeconomice și bioeconomice pentru siguranța și securitatea alimentelor și furajelor din ecosisteme antropice*, Editura Economică, ISBN 978-973-709-681-4.
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13. Bogdan A.T., D.L. Diaconescu, Amalia-Gianina Străteanu, S. Chelmu, I. Surdu, M.Th. Paraschivescu (2009), *Soluții pentru criza zootehniei prin asigurarea independenței și suveranității agroalimentare durabile a României Europene* (dezbatere națională „Ce putem învăța de la actuala criză economică?”, Aula Academiei Române, 14 aprilie 2009), Editura Academiei Române, ISBN 978-973-27-1802-5.
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15. Otiman P.I., D. Grigorescu, M. Enache, A.T. Bogdan - coordonatori (2010), *Geo- și biodiversitatea în Țara Hațegului - Retezat*, vol. I, Partea III - Studiu privind identificarea de metode și instrumente de monitorizare, conservare și valorificare a biodiversității în arealele Rezervația Științifică Gemenele – Retezat și Țara Hațegului, Editura Academiei Române, București, ISBN 978-973-27-1941-1.
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17. Comșa Dana, A.T. Bogdan (2012), *Eco-Bio-Diplomație, un nou concept pentru o dezvoltare durabilă inteligentă, într-o lume globalizată, în context eco-bio-economie*, Editura Academiei Oamenilor de Știință din România, București, ISBN 978-606-8371-61-0.
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III. Patents :

1. Bogdan A.T. și col. (1979) - *Pahar izoterm pentru recoltarea și diluarea materialului seminal*. Certificat de inventator nr. 71894, OSIM;
2. Bogdan A.T. și col. (1979) - *Speculum luminos pentru vaginoscopie la animale*. Certificat de inventator nr. 71895, OSIM;
3. Bogdan A.T. și col. (1979) - *Pahar izoterm pentru recoltarea și diluarea materialului seminal la tauri*. Certificat de inventator nr. 71898, OSIM;
4. Bogdan A.T. și col. (1979) - *Pahar izoterm pentru recoltarea și diluarea materialului seminal la vieri*. Certificat de inventator nr. 71899, OSIM;
5. Bogdan A.T. și col. (1981) - *Procedeu biotehnic de însămânțare artificială a animalelor, în special a scroafelor*. Certificat de inventator nr. 78811, OSIM;
6. Bogdan A.T. și col. (1981) - *Vagin artificial pentru recoltarea biotehnică a materialului seminal de la armăsar*. Certificat de inventator nr. 78812, OSIM;
7. Bogdan A.T. și col. (1981) - *Vagin artificial pentru recoltarea biotehnică a materialului seminal de la vier*. Brevet de inventie nr. 78813, OSIM.
8. Bogdan A.T. și col. (1981) - *Aparat pentru recoltarea biotehnică a zigoților în special la animale*. Certificat de inventator nr. 78827, OSIM;
9. Bogdan A.T. și col. (1981) - *Recipient izoterm pentru identificarea zigoților*. Certificat de inventator nr. 79303, OSIM;

IV. INNOVATIVE CERTIFICATES

1. Bogdan A.T. și col. (1978) - *Metodă tactilo-cervicaiă pentru inocularea materialului seminal la oi*. Certificat de inovator nr. 73, Ministerul Educației și Învățământului;
2. Bogdan A.T. și col. (1978) - *Baie izotermă pentru efectuarea însămânțărilor artificiale la ovine în zone colinare și submontane*. Certificat de inovator nr. 74, Ministerul Educației și Învățământului;
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