ANABOLICS, ITS TECHNICAL AND ECONOMICAL INTERPRETATION

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1. INTRODUCTION

The anabolic issue is not only a matter of technical discussion, but for better understanding , the economical, political and cultural impediments for its use, have to be considered, too.

Opposite to the technical requirements demanded to all pharmacologics, which are based on scientific principles of safety, purity and efficacy, also assess on risk analysis , today appears the concept of precaution, that is based on non measured possible risks, that science can not capture, but that is expressed by human instinctive reactions such as of economical defense and prejudice.

As to describe this dual raising we have to cover three aspects: The toxicological, the economical and the cultural :

2. TOXICOLOGICAL ASPECTS

Tanking into account the old concept of Paracelsius (1493-1541) about "the difference between a poison and a medicine is the dose" the answers to the anabolics issue have to be found out in three important questions.

a) That the anabolics do not show genotoxicity. This means that if a compound is active on the genetic cell material and may cause mutations and reproduction changes, that will end in cancer , just only ONE molecule may have harmful effects. This is not the case of anabolics which do not act in a level of genetic cell material but through the cell receptors which facilitate the synthesis of proteins. Chart III shows the most used techniques to detect mutagenic changes in a compound.

b) This place anabolics in the study of the quantitative toxic levels applied to ALL RESIDUE IN FOOD FOR HUMANS which are defined by NOEL and NHEL and ADI. Chart I shows the toxicity level for five anabolic (three natural and two Xenobiotic) which proves that are safety for a level of consumption within a range of indisputable safety.

c) The third aspect is the reliability of current analytic techniques and the awareness to determinate accurately and specifically residues of anabolics in food for human consumption.

By means of techniques such as Gas Chromatography, Mass Spectrophotometry RIA and HPLC, residues of anabolics can be detected within a range of ppb and ppt, and thou it can be distinguished the pharmacological level of action and the toxicity with great sensibility and specificity. That is very important as to eliminate false estimations and confusion of the substances, by studying and guarantying results on their correct use and levels of activity according to different doses. Chart II shows analytic techniques and its grade of sensibility toward different anabolics.

3. ECONOMICAL ASPECTS

The fixation of proteins in the organism is a process of low metabolic performance, on the grounds that in the mammals it is necessary to process 9 parts of proteins to fix 1 (turnover of proteins). This is the main reason in using substances which increase the fixation of N , such as anabolics, in order to make more effective the process of accumulation of proteins in the animals. The need to produce tender meet from younger animals, which are feed to reach a slaughtering weight in less period of time, is the reason for the using of growth promoters in intensive growing methods, such as "feed lots" or half intensive in pastures. Principles are the same, but the importance is to obtain more tender meat in a short period of time and with high performance.

That is the reason because in USA, which is a high competitive country within the meet market, the 80% of steer are fattening up with anabolics, and in the EU, where the livestock production is subsidize with more than USD 100 per animal, any method to obtain high animal production is discouraged. This explains why in Argentina, where the bovine meat stills being cheep, and the bovines are bred with extensive growing methods , the need to decrease the fattening up days is not so critical, unless especial cases, and that is why there is not a general demand of anabolics, like in other countries.

Researches made in the nutrition laboratory of Mallinckrodt in USA, on weight gain through conversion of daily food in cattle, demonstrate that to fat up a steer from 150 kg to 450 Kg, are needed 270 days to obtain a daily gain of weight of 1.200 gr. with a total consumption of nutrients, of 250 Kg. of proteins and 1800 Kg of dry food. As to obtain same weight but reducing to 250 gr. daily increase of weight , 1200 days are needed but with a total consumption of 652 Kg. of proteins and 7.320 Kg. of dry food. There is no doubt that the economical difference is remarkable, so as to support the position of promoting better conversion by using anabolics, reducing time of growth and gaining weight, for better feed performance.

4. CUSTOMS AND CULTURAL ASPECTS

During the 60' within certain European countries and also in the USA , the Diethylstilbestrol and derives, which are synthetic substances, and absorbed in the digestion truck, with high level of toxicity because the estrogenic effects, were intensively used with medical purposes. This reported non desirable effects on children and pregnant women.

These synthetic substances of estrogenic action, of intake through food , caused effects of rejection to all substances related with reproduction. Reports on studies made on the toxicity of anabolics that demonstrate are safety , are worthless for many public opinion, despite the non-toxicity of the referred substances when adequately used, as shown on Chart I. The European consumers reject for extension or analogy any substance which remind them the Dehidrostilbestrol, beyond any technical evidence of safety of current anabolics. As an outcome of the scientific reports, that always have limitations, that of all technical knowledge , appears the concept of PREVENTION.

In addition to this cultural background, are also the tax inconveniences, which are derived from the EU's subsidize to the bovine meat production. It is obvious, that the European Governments discourage any technological methods to promote high meat production, on the grounds that this means greater subsidizes.

The combination of these two issues produce the bases for the sectors banning anabolics, that take into account the principle of PRECAUTION, beyond any scientific demonstration on the contrary. Even, the WTO report that punish the EU to pay annually several hundred of millions of dollars in return for retaliation to USA and Canada, because the EU does not take into account the scientific reports when banning the use of anabolics.

As a conclusion, anabolics should have to be used for purposes of high performance in meat production , through fast animal growth and saving of feed, preferentially in intensive and half intensive systems.

The profit/cost equation, which considers productive performance and low costs, that must include the demand of 6.500 millions of consumers in the world, against the thousand of millions of dollars spent for EU subsidizes, will define the use of anabolics in the future, but we do not know yet, how close it is.

Chart I

A	B	C	D	E	F
COMPOUND	DAILY PRODUCTION Minimun values	LEVEL OF IMPLANTATION Minimum values	MRL (*)	ADI	RELATION
NATURAL	ug	Pg/g	Ug/Kg	ug/Kg (ppb)	B/C
OESTRADIOL 17B	6 (1)	8-17 (2)	NOT NECESSARY		1:1.500
PROGESTERONE	150 (1)	400 (2)	NOT NECESSARY		1:770
TESTOSTERONE	32 (1)	70 (3)	NOT NECESSARY		1:1.100
XENOBIOTICS		Ng/gr (ppb)			D/C
ZERANOL	EXTERNAL	0.014 to 0.031 (5)	Muscle.2* 0-0.05 Liver 10 (4)		1:140
TREMBOLONE	EXTERNAL	0.02 (6)	Muscle 2 * 0-0.02 Liver 10 (4)		1:100

NOTES
(1), (2), (3), (4), (5) and (6) (see Pertinent Literature)
ug/Kg: ppb (microgram/kilogram): part per billion
ng/gr:ppb (nanogram/gram): part per billion
pg/gr :ppt (picogram/gram): part per trillion
ADI: Admisible Daily intake (NOEL or NHEL): Safety range 100 to 1.000
MRL: Maximum Residue Limit. (ADI x 60 Kg person): 500 gr meat = value ug/Kg (300 gr meat, liver - 100 gr , kidney - 50 gr., fat - 50 gr- JECFA)

The FDA tolerance for residues determinates that it is not necessary to establish a MRL for an intake when less than 1% of the daily human production of hormone. Values for this relation are: 1:1.500 – 17 B oestradiol, 1:770 – Progesterone and 1:1.100 Testosterone. Concerning the Xenobiotics, it has been demonstrated that, even taking into account safety factors, ADI should be of 140 Kg, of meat containing Zeranol implant and 100 Kg containing trembolone

Chart II

MORE USUAL ANALITIC METHODOLOGY TO DETECT ANABOLIC RESIDUE

COMPOUND	TISSUE MARKER	ANALYTICAL METHODOLOGY	LIMIT OF DETECTION
OESTRADIOL 17 B	LIVER/SERUM	RIA	0.01 PPB
PROGESTERONE	LIVER/SERUM	RIA	0.05 PPB
TESTOSTERONE	LIVER/SERUM	RIA	0.1 PPB
TREMBOLONE ACETATE	LIVER/MUSCLE BILE/URINE	RIA HPLC	0.1 PPB 1 PPB
ZERANOL	LIVER	GC-MS HPLC	1 PPB 0.3 PPB

RIA (Radio-immuno-assay)
HPLC (High Performance of Liquid Chromotography
GC (Gas Chromotography)

Chart III

TESTS USED TO DETECT MUTAGENIC AND CARCINOGENIC EFFECTS IN PHARMACOLOGICAL PRODUCTS

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