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*Eastern Illinois State College*

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A GUIDE TO THE PURCHASE OF  
FOOTBALL EQUIPMENT

by

Louis K. Voris

July 1955

A GUIDE TO THE PURCHASE OF  
FOOTBALL EQUIPMENT

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A Substantial Paper  
Presented to  
the Faculty of the Department of Education  
Eastern Illinois State College

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science in Education

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by  
Louis K. Voris  
July 1955

## PREFACE

It is desired to thank the following men and Sporting Goods Companies for their assistance in helping prepare the data in this paper. Their willingness to allow visits to their factories and offices and the cooperative spirit in which they answered the many questions put forth has proved invaluable. Mr. Ken Roughton, Manager, Lowe and Campbell Athletic Goods, Chicago; Mr. Don Bryant, Western Division Manager, Wilson Sporting Goods, Chicago; Mr. Bill Bird, Western Division Sales Representative, Rawlings Sporting Goods Company, St. Louis; Mr. Meynard Meegan, Lowe and Campbell Athletic Goods, St. Louis; Mr. Frank Carrideo, formerly backfield coach, The State University of Iowa, Iowa City; Mr. Edward Duncan, retired representative, Lowe and Campbell Athletic Goods, Champaign; Sand Knit Goods, Chicago; Spotbilt Athletic Shoes, Chicago; Wilson Packing Company, Chicago.

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## CHAPTER I

### A GUIDE TO THE PURCHASE OF

### FOOTBALL EQUIPMENT

#### INTRODUCTION

During several years of selling contacts with coaches and athletic directors of high schools, colleges, and universities, as well as of independent and professional athletic teams, it was often evident that buyers were lacking in the knowledge necessary for intelligent purchasing of equipment. Responsible, well-meaning purchasing agents often outfit large numbers of players with unwise choices of equipment (particularly football) because they are unable to locate adequate, unbiased background information.

In most schools the resources for conducting athletics is limited. Gate receipts plus a very nominal amount from the Board of Education, in most cases, regulate the budget. The coach and athletic director has a responsibility to the participants and public to equip his teams adequately for protection, adaptability and appearance.

In spite of the fact that sports equipment is a large item in the budgets of most schools, it is the only field



in which there has been no reliable guide to take the place of trial and error in the purchase of materials and equipment. The closely guarded trade secrets and lack of reliable testing information make it impossible to define final and fixed solutions to this problem.

The information presented in this paper was obtained from four years' actual experience in visiting and working in athletic goods factories and selling to personnel in eastern Illinois, Northern Indiana and Southwestern Michigan. The experience of representing several major companies, and the personal contact with the men who design, manufacture and use the equipment has provided considerable technical and practical information. This background material should prove valuable to men entering the administrative portion of our nationwide athletic program.

The athletic goods representatives that call on personnel periodically is usually well trained and makes it a point to help. They not only want to be helpful and build up a good clientele but many of them are sportsmen desirous of perpetuating clean and safe athletics. It is difficult to tell a person what, how, when, and where to buy but below are listed some well proven Do's and Don'ts that are good to follow in making purchases:

1. Patronize the athletic goods companies that send a representative to call on you.

2. "Lay-off" the special circulars from fly-by-night firms.

3. When making substantial purchases look over the equipment of all the salesmen.

4. Do not give one representative or company all of your business. You might miss some real bargains.

5. If something entirely new in type and construction is offered, do not "go overboard" until you have tested it under game and practice conditions.

6. Watch out for the salesman that criticises the other man's equipment or line of merchandise.

7. Do some price buying but if you buy on a bid basis be absolutely certain that you specify in detail, otherwise, you place the more responsible firms at a disadvantage.

8. Try to purchase equipment for the next season immediately after your present season. You will have in mind much better the equipment that gave the best service and a more accurate count of necessary replacements. There will also be more certainty of delivery when you want it.

There will be no attempt to equalize the quality of each companies' goods or recommend one trade mark over another. It is intended, however, to familiarize young men entering the coaching field with some fundamentals of design, material and workmanship that will aid them in making sound purchases for their athletic departments.

## CHAPTER II

### A GUIDE TO THE PURCHASE OF THE FOOTBALL

#### I. MATERIALS

Full grain leather. The top three to four grades of grain leather are cut from number one select grade steerhide. This number one select rating is judged not only from apparent quality but by the general health, age and sex of the animal. All portions of a side of leather are not of the same quality and thickness. Therefore, it becomes a definite problem to select the portions of a hide from which the various grades of football leather must be obtained. A side of leather is one-half of a complete hide cut along the butt, shoulder, belly and flank of an animal.<sup>1</sup> Although the use of a side leather is the most economical, since it consumes the entire hide without any waste, it also creates a problem of manufacturing several grades of balls and selling them in the proper percentages.

In order to take care of increasing demand for the better grade balls the companies have been permitted to purchase number one select cuts in the form of a bend,

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<sup>1</sup>Sporting Goods Manufacturer (name withheld by request), "1954-55 Sales Manual", p. 1A2.

which is a side with a shoulder, belly and flank cut off.<sup>2</sup>

Tannage. Tannage can be either vegetable, chrome or chrome retan, although the best leather for footballs is vegetable tanned. One of the principal reasons why vegetable tanned leather is best is that it retains the pebble finish much longer than leather tanned by any other process. The leather used in most top grade footballs is not only vegetable tanned, but is also full grained and aniline dyed. Full grain means the top surface of a tanned hide is not sandpapered or buffed before the pebble effect is pressed in. Aniline dyed means the coloring has been produced without the use of any pigment. When producing a corrected grain, pigment finish, leather tanners can use lower grade hides because imperfections can be buffed out and covered with the heavy finish. The reverse is true in the case of aniline dyed leather since every surface blemish is clearly visible through the clear finish. Even marks of quality, such as fat wrinkles which are always present in the hide of a healthy animal, can be easily seen.<sup>3</sup> This is being stressed because it is a common error to associate streaks in a football with poor leather, when actually, this is

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<sup>2</sup>Ibid., p. 1A2.

<sup>3</sup>Wilson Packing Company, "Tannage and Processing of Athletic Leather", p. 8-9, (Mimeographed).

not true.

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The dark color of leading manufacturers' top grade football is due to the dyes, special oils and greases forced into the pores of the hide during the tanning process. This provides the "tacky" feel so desirable in balls used in today's passing game.

Water Repellency. Tanners the past several years have been concentrating much of their research efforts toward making a water resistant leather. Their efforts have been rewarded to the extent that a water repellent treated football absorbs only two-thirds as much weight after a 30 minute immersion as an untreated ball absorbs after 5 minutes.<sup>4</sup> Water repellency is accomplished by treating the leather after the tanning process with a special material which makes it water resistant without affecting the desirable qualities associated with the old leather football which became water-logged and stretched out of shape when used in wet weather. Another advantage of the water repellent leather is that, even when wet, the football does not become slippery but retains a natural leather feel.

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<sup>4</sup>Sales Manual, op. cit., p. 1A3.

FOOTBALL WATER REPELLENCY TEST<sup>5</sup>

Ball Tested	Original Weight - Size	After Immersion in Water			
		5 min.	%	30 min.	%
#1					
Untreated	14.28 oz.	18.57	30.1	19.77	38.4
Leather	21 inches	21 2/16	0.6	21 3/16	0.9
#2					
Repellent	14.84 oz.	16.08	8.4	17.68	19.1
Leather	21 inches	21	0	21 2/16	0.6

Careful study of the preceding table reveals that the water repellent ball absorbed only two-thirds as much weight after a 30 minute immersion as the untreated ball absorbed after 5 minutes.

White and Yellow Leather. The description pertaining to the number one select full grain leather applies to white and yellow footballs except that this leather is of chrome tannage, which provides a better base for the lacquer used in the top finish. The white penetrates the entire thickness of leather. The manufacturers are well aware that the white or yellow ball cannot be made to equal the "feel" and durability of the vegetable tanned ball and, as a result, they have met with considerable success in introducing the best grade football with white stripes.

The white and yellow footballs were introduced specifically for night games and proved excellent as far as

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<sup>5</sup>Ibid., p. 1A3.

visibility was concerned, but the premature cracking of the leather and the fact that the lacquer surface became quite slippery when wet, caused the manufacturers to seek a more satisfactory answer to the problem in the full grained vegetable tanned ball with two white stripes.

Split Leather. Most of the medium priced footballs are produced from the same hide as those of the best quality. The essential difference being that this leather is taken from the "belly" or undercut of the select grade hide. This particular portion of the hide is unusually thick and in order to meet the correct specifications of football leather, has to be split to the correct thickness. Many split leather balls have a tendency to crack but if the leather is properly tanned (vegetable) and pebbled the resultant football will be very serviceable.

Football Lining. Control of stretch and strength in a football is very important since it is directly connected with the shape and life of the ball. The material used in most of the major manufacturers' sewed type balls is known as 9 ounce Herringbone Double Twill. Some of the cheaper footballs on the market use a considerably less serviceable grey goods which lacks the tensile strength to maintain the specifications of an official ball. The lining of a ball consists of two or three plies of the 9 ounce fabric

combined with natural rubber.<sup>6</sup> It may be well to point out that some manufacturers use a so-called triple lining in medium priced footballs which is nothing more than two ply double twill with a third layer similar to sheeting or cheese cloth.

Bladders. The bladders used in all of the footballs are standard in the industry. As a rule there are two bladders in each group, such as football, basketball, volley-ball and soccer. The more expensive bladder is known as an official bladder and is football shaped. The cheaper bladders are of thinner rubber stock and weigh less than the official bladder. This weight is important since it has a great deal to do in making the finished ball the proper weight. One of the more recent improvements in bladders is the use of the new improved synthetic rubber instead of natural rubber. These new bladders hold air much longer and are less susceptible to deterioration due to age and temperature.

## II COMPARISON--TWO PROMINENT FOOTBALLS

There are two major athletic goods manufacturers that enjoy an almost exclusive domination of sales in the top grade official football. A comparison test was made in

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<sup>6</sup>Ibid., p. 1A3a



1954 in which one dozen balls, from each company, were picked at random and thoroughly tested with reference to all features. The results were as follows:<sup>7</sup>

1. The leather was identical and was purchased from the same tanner.

2. The color of one was brown and the other had a reddish brown shade. This was done deliberately by the tanner in order to affect a slight difference in appearance but does not affect the tanning process or feel of the leather.

3. From the standpoint of size, shape, spacing of the lace holes, and other specifications, the two balls were identical, except that one group of balls did maintain a slightly better uniformity in size.

4. Conclusion--As far as physical appearance, playability and durability the two balls were practically identical, therefore, the popularity of one ball over the other in any given locality is due to tradition and other psychological factors.

### III. CONSTRUCTION OF THE FOOTBALL

In assembling the major parts of a football the inflated goods craftsman is confronted with a serious problem of size and weight specifications.

Size control is obtained by using cutting dies made to very accurate and exact patterns. The size of these patterns is varied depending upon the material used. If, for example, the football lining was changed to a different

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<sup>7</sup>Ibid., pp. 1A3a-1A3b.

twill which did not have exactly the same consistency and stretch, the finished product would not, in all probability, come close to meeting the desired specifications. To illustrate this point still further, the cutting die used for the top grade balls is different than the other balls. The split leather ball is different again; in other words, no two grades of leather can be cut from the same die.

Through a long period of evolution the pattern for each type football has been developed to the point where the desired shape and size for each has been obtained. In actual production there is a variation caused by the fact that each leather panel is slightly different than the next. Each square inch of leather in a hide may be a little more stretchy or firmer than the part next to it. This cannot be controlled by the tanning process entirely, although the tanning of football leather is done under rigid specifications and inspection. Since each hide varies depending on its age, sex and general health, it is easy to realize that uniformity is a problem.<sup>8</sup>

Below is an illustration demonstrating the method used in obtaining the official weight for the standard football. The weight is obtained as follows:<sup>9</sup>

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<sup>8</sup>Wilson Sporting Goods Co., Chicago, Ill., Visitation and Personal Notes, Dec. 28, 1954.

<sup>9</sup>Ibid.

Leather .....	6 4/8 to 6 6/8	oz.
Lining .....	4            4	oz.
Bladder .....	3 1/2 to 4	oz.
Lace, thread and cement .	1/8            1/8	oz.

As illustrated above, the manufacturers work to very close tolerances. Bladder manufacturers insist upon a 1/2 ounce variation, which is as close a tolerance as they can attain. The specification for the leather panels can vary 1/2 ounce, therefore, each of the four panels has a tolerance of 1/16 ounce. Accuracy is obtained in the panel construction by splitting or shaving the back of each panel. Some of the smaller football manufacturers are unable to acquire special machinery for this splitting process so it is more or less impossible for them to produce a well balanced ball even though it does meet the weight specifications.

#### IV. THE RUBBER-COVERED FOOTBALL

Typical of most activities of a traditional nature, football exponents have been reluctant to accept one of the most recent developments in the game, the rubber-covered football.

Manufacturers have been quite successful in producing a rubber-covered ball that is difficult to distinguish from the better leather balls. After several years of use, on an experimental basis by select schools, the rubber-covered

ball has been accepted as official and can be used in regular scheduled games. Opposing teams are allowed to choose either the official leather or rubber-covered ball, and if the teams do not agree on one type of ball, each is allowed to use the ball of its choice while on offense.

"According to those who favor the rubber-covered ball, rubber can be compounded in such a way that an expert who has been blindfolded cannot tell the difference between it and leather. They further state that, since the rubber-covered ball is lined with fabric and is vulcanized so that its various layers of bladder, fabric and cover form a cohesive unit, a rubber-covered ball will retain its shape better than a leather ball. The cost is a vital point, for on the whole the initial investment in a rubber-covered football is somewhere between one-third and one-half as much as a top-line leather one. All of these factors--low cost, longer wear, longer official performance, according to those who have used rubber-covered balls--represent more value per dollar than in any other type of ball."<sup>10</sup>

Cover. The cover of the rubber-covered football is a combination of cold rubber and plastic resin. Cold rubber is one of the more recent developments of the tire industry

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<sup>10</sup>Virginia Bourquardez, and Charles Heilman, Sports Equipment (New York: A. S. Barnes and Company, 1950) pp.121-22.

and is noted for its durability and long wearing quality. The plastic resin gives the finished ball a "feel" comparable to a good leather ball and adds substantially to the ability of the cover to resist abrasion.

Carcass. On the top grade balls the carcass is made of full length plies of 8.5 ounce duck impregnated with rubber. The first two plies are applied with lapped seams and the final ply applied with butt seams, in order to prevent the lapped seams from showing through the cover of the ball. The rubber cover is then applied and the entire unit molded into one integral piece.

Reinforced lace holes are molded into the edges of the lace opening and the ball is double leather laced through these holes. The leather lacing on the ball is solely for the purpose of better appearance and "feel".<sup>11</sup>

#### V. SELECTING A FOOTBALL

It is wise for the administrator or coach to keep in mind the following suggestions in making his selection of footballs if he desires to get durability, uniformity and the most for his money:

1. Quality of leather used.
2. Type of lining--triple, double or single.

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<sup>11</sup>Sales Manual, op. cit., p. 2A4.

3. Type of seam sewing--Lockstitch.
4. Type of bladder--Official or two piece.
5. Method of lacing--Leather or plastic.
6. Official size and weight--yes or no.

## VI. RECOMMENDATIONS

Leather Football. The selection of a leather football should be limited in scope from the medium priced up to and including the best grade ball. The footballs in this group are made from top grade leather. The price differentiation for these balls is due to the portion of hide from which the leather is cut, type of fabric used in the lining, layers of lining and tannage process. Referring to previous descriptions of hides and tannage it is seen that the cheaper balls are made from the thick and less desirable cuts of the top grade hide. If the lower priced balls are vegetable tanned, treated for water repellency and have, at least, double lining of good twill, there is no reason why they cannot be used for practice and games.

Bourquardez and Heilman have elaborated on the suggestions made in Part V, Chapter II of this paper. It is recommended that the prospective purchaser of footballs inspect cut-away reproductions of the balls under consideration, keeping in mind the following:

1. Leather--no loose fiber, sponginess and broken grain. Thickness not less than  $3/64$  inch, and finished

side pebble grained, aniline or pigmented finish. Finish should not crack, rub off, peel or flake off excessively.

2. Lining--high grade twill; not less than two plies; three is recommended.

3. Stitching together of leather panels--waxed linen thread ten ply or equivalent size cotton thread; lockstitched seams using five or six stitches per inch, lockstitch adjusted so that lock is formed on bottom side of seam; no broken or skipped stitches.

4. Bladder--free of leaks or weaknesses.

5. Lacing--thickness not less than  $1/32$  inch; width approximately  $3/16$  inch; breaking strength not less than 35 pounds when tested at room temperature.

6. Stitching of lining to leather panels--a lockstitch and the thread no finer than  $20/4$  cotton thread; stitching no less than  $1/16$  or more than  $3/32$  inch from the edge and smooth without wrinkles or puckers; five to eight stitches per inch.

7. Size and weight--circumference of the major axis 28 to  $28\frac{1}{2}$  inches; the minor axis,  $20\frac{1}{2}$  to  $21\frac{1}{2}$  inches; and the weight,  $14$  to 15 ounces.<sup>12</sup>

Rubber-covered Football. The commendable qualities of the rubber-covered football are described in Part IV, Chapter II. Some football authorities predict that the rubber-covered ball will eventually replace the leather ball.

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<sup>12</sup>Bourquardez, op. cit., p. 127.

## CHAPTER III

### A GUIDE TO THE PURCHASE OF SHOULDER AND HIP PADS

#### I. SHOULDER PADS

Types. There are three distinct types of shoulder pads manufactured at the present: the outside cantilever, inside cantilever and flat pad. There are many styles or variations of each of these and coaches have debated long hours over the good and bad characteristics of each.

An important feature in all types of pads is that they be so constructed as to distribute forces of impact over as great a surface as possible. All of the better grade pads manufactured have this important characteristic.

Shoulder pads are made up essentially of fiber, padding, padding cover and leather. The manner in which the fiber formation shell and padding is used denotes the type pad.

The outside cantilever pad has the padding attached to a base fiber shell which covers the collar bone, breast and back. The cantilever effect is accomplished by constructing a double ply fiber bridge over each shoulder and attached to the base fiber on the breast and back.<sup>1</sup> Attached to this

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<sup>1</sup>Statement by Ken Roughton, Mgr., Lowe and Campbell Athletic Goods, Chicago, Personal Interview.



fiber bridge, with leather or web hinges, are the snubbers and fiber epaulets.

The cantilever pads are designed to distribute the force of impact more evenly over the shoulder. This is done by attaching the fiber bridge on the breast and back in order to impart the force to those points. However, this particular asset is somewhat minimized due to the added height of the pad above the shoulder which interferes with a player's head, neck and arm action. The outside cantilever was designed to eliminate some of the interference to arm action but this design brought up another weakness, namely, that the narrow fiber bridge would be subjected to practically all of the force of impact when making a block.

Most players agree that the cantilever pads can be more easily shifted out of position and that an opposing defensive man can not only hold on to the pad more easily, but exercise more leverage in displacing the blocker.

The flat pad does not boast any outstanding feature that takes care of one particular characteristic but, compared with either cantilever pad, it gives a better fit, can be held in position better and is more comfortable for most players to wear, especially those wearing the large plastic helmets.

The inside cantilever differs from the outside cantilever in that the entire body of the shoulder pad shell is

bridged over the padding. The padding and fiber shell are attached only at the base of the breast plate and back plate.

The flat shoulder pad is constructed so that the padding and shoulder pad shell are attached throughout their surface. The fiber epaulets and padded fiber snubbers are attached to the basic fiber shell by means of leather or web hinges.

Padding. Three kinds of material are used as padding: foam rubber, vinyl foam and kapok. The better pads are lined with foam rubber or vinyl foam and probably give the best protection, however, when subjected to water or perspiration the foam rubber tends to lose its resiliency more rapidly than the vinyl foam. In order to prevent the penetration of water and perspiration, manufacturers have covered this padding with "airplane cloth" or nylon. These two materials have low absorption rates and do give longer life to the padding.<sup>2</sup>

Kapok padding is not as resilient as the foam rubber or vinyl foam. Kapok does have a very low rate of absorption as evidenced by its use as the basic material in the vest type life preserver. Kapok does tend to pack and become quite hard when subjected to perspiration. Probably, the

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<sup>2</sup>Ibid., Personal interview.

only advantage kapok has over the other two types of padding is that it can be reconditioned quite easily, whereas, the other cannot be restored. This one asset of kapok, however, does not make it the most desirable for the resiliency of foam rubber and especially vinyl foam far overshadows the reconditioning feature. The covering used on kapok shoulder pads is a drill cloth which is not designed to repel water or perspiration but merely to give shape and hold the kapok in place.

Binding. The binding used on the snubbers and neck trim, where contact with the player's skin cannot be prevented, is a soft and pliable sheepskin or knit cotton. Sheepskin has durability but does become hard when soaked with perspiration. Cotton knit will not last as long and will become hard and scratchy when subjected to the same conditions, however, it can be cleaned more readily than the sheepskin.

Good grade cowhide leather is used on shoulder pads to bind the outside edges of the fiber, as hinges for snubbers and epaulets, as washers for all riveting and as leather lace tabs. It is important that the leather be water repellent in order to withstand the conditions of water and perspiration. Leather contributes a great deal to the life of the shoulder pad because of its strategic use at important stress points.<sup>3</sup>

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<sup>3</sup>Ibid., Personal interview.

Features to check. Below are listed important features to check when anticipating the purchase of shoulder pads:<sup>4</sup>

"Pad. 1. Padding--kapok should not be matted or lumpy and should have adequate thickness; Prime Java kapok is best. If reclaimed kapok is used, it should have adequate thickness and resiliency and be covered with moisture-proof cloth or similar covering.

2. Fabric--no material defects or needle chews which might develop into holes or tears.

3. Seams and stitching--no more than three broken or skipped stitches on the fabric; no run-offs on binding; no fewer than three or more than five stitches per inch on the fiber; and the fineness of thread should be not less than 10/5 cord linen or cotton for fiber. For fabric, eight to twelve stitches per inch is satisfactory and the fineness of thread should be not less than 36/4 cord. (Variation in number of stitches per inch is permitted when due to speeding up machine or to pulling the material in order to sew over heavy seams or thick places on the shoulder pad, or in turning corners.)"

Fiber Pieces. 1. Quality--not less than 9/100 inch thick and no cracks or holes.

2. Position--proper alignment with the padding is

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<sup>4</sup>Virginia Bourquardez, and Charles Heilman, Sports Equipment (New York: A. S. Barnes and Company, 1950) pp. 121-22

important.

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3. Size--flaps approximately 10 1/2 by 4 1/4 inches; cap approximately 8 1/4 by 4 3/4 inches.

Leather Hinges. 1. Width--not less than 2 inches wide and 1/16 inch thick.

2. Riveting to fiber--all fiber pieces securely clinched; no fewer than three rivets on flap and cap; and no fewer than two rivets on the arch.

Binding on Fiber. 1. Presence--absolutely essential for the area around the neck and important to have flaps bound.

2. Type--for the neck, sheepskin better than cowhide; both better than tape or cloth. For flaps, cowhide best; tape or cloth is a second choice.

Eyelets. Presence--not fewer than three on a side and the clinching must be secure.

Elastic straps. Width--straps not less than one inch and securely riveted at each end."

## II. HIP PADS

Types. Manufacturers have designed hip pads to meet the requirements of each position and type of player on a football team. As in football clothing and shoulder pads, protection and ease of action are the essence of a good hip pad. Hip pads are designed to meet individual requirements and this depends largely on the assignments to be carried

out by a player. As a rule, fast ball carriers will wear a very light weight pad made of smaller fiber pieces or made up entirely of foam rubber or vinyl foam padding. This latter pad, less fiber, has double thickness padding over the spine, kidney and hip joint. Linemen, as a rule, wear a large fiber pad with corrugated fiber protection over the coccyx and cupped shaped fiber designed to protect the kidney and hip area. Most of the fiber pads have a fiber epaulet, hinged by leather, hanging between the kidney portion and the hip joint area. It is necessary to have this two piece fiber make-up with the hinged protector, in order to afford ease of action.

Wearing the Pad. It is important that players be taught to wear the hip pad properly. Many players wear the pads either too high or too low, stating that the pad feels more comfortable and allows more freedom of action. It is quite possible that the peculiar design of a hip pad makes it uncomfortable for certain players. Coaches should give careful consideration to furnishing hip pads comfortable to the individual player for if it is not, the player will wear the pad improperly and destroy much of its protective value.

Things to Check. When selecting or inspecting hip pads examine for the following:

Pads. Requirements for padding, fabric, seams and stitching the same as for shoulder pads.

Fiber Pieces. 1. Quality--thickness of the hip guard and kidney guard not less than 8/100 inch and for the slap and spine guard not less than 7/100 inch. Look for cracks.

2. Position--fiber pieces sewed less than one inch from top of padding.

Kidney Hinges. Construction--made of leather and the rivets secure.

Hip Flaps. Lacing--hip flaps laced securely to the kidney hinge; the lacing of leather.

Buckle and Strap. Construction--a buckle is better than D rings; the riveting should be secure, and the webbing should be not less than one inch wide and 1/16 inch thick. Zig-zag stitching or some other method to prevent unraveling at the end of the strap should be used.<sup>5</sup>

### III. INJURY PADS

There are several types of injury pads designed for specific uses. Most injury pads are made of foam rubber or vinyl foam and reinforced with fiber shaped for specific contours. "In selecting an injury pad the most important principle to keep in mind is to radiate the shock away from

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<sup>5</sup>Ibid., p. 122.

the injury spot."<sup>6</sup> Many coaches and trainers construct their own injury pad. This is probably the most economical and will meet individual needs better.

#### IV. KNEE PADS

Freedom of movement and protection are very necessary considerations in determining the selection of this pad. As described previously in this chapter, the best pads are made from either foam rubber or vinyl foam. Kapok is available but does not compare favorably to the above mentioned, for protection at this vital area. "Whatever knee pad is purchased or improvised, they should be wide enough to cover the medial and lateral epicondyles of the tibia and high enough to protect the muscles between the area covered by the thigh guards and the knee cap."<sup>7</sup>

#### V. BLOCKING PADS

This pad is often used by guards or blocking backs who execute a great number of crossbody blocks. The blocking pad is constructed of the same materials used in shoulder and hip pads. The separate unit type pad with shoulder straps is usually preferred to those that are laced to the shoulder pads. As in other football

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<sup>6</sup>Ibid., p. 123.

<sup>7</sup>Ibid., p. 123.



protective gear, the foam rubber or vinyl foam padding are preferable to kapok.

## VI. THIGH GUARD

This is a combination corrugated fiber-padded protector designed to fit into pockets provided in the thigh of the football pant and shaped to fit snugly to the thigh. It is important, in selecting thigh guards, to judge the type of fiber, thickness and type of padding, and size.

Thigh guards come in four sizes: 9 by 9 inches, 8 by 10 inches, 9 by 10 inches and 9 3/4 by 10 1/4 inches. Any style pad can be obtained in the above sizes.

The following description of thigh guards distinguishes between the three styles:

1. Corrugated fiber, 1/4 inch "ensolite" (cotton) padding on the outside, 1/4 inch vinyl foam rubber inside, airplane cloth cover.
2. Heavy corrugated fiber, whipcord cantilever inside, with vinyl foam rubber padded edges. White felt outside.
3. Corrugated fiber, quilted padding (kapok), vinyl coated fabric bound.<sup>8</sup>

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<sup>8</sup>Lowe and Campbell Athletic Goods, Advance Football Catalog No. 187FS (Chicago: Lowe and Campbell Athletic Goods, 1955) p. 12.

## VII. RECOMMENDATIONS

In purchasing the various types of pads the coach should be interested, primarily, in protection. Protection depends upon type of padding and reinforcement of either fiber or additional padding. The most expensive shoulder and hip pads have cheaper counterparts that possess most of the basic top quality protective devices such as: vinyl foam padding, ample fiber reinforcement, and design.

A coach can save approximately one third of the top quality pad price by accepting: drill cloth padding cover in place of nylon cloth, cotton knit neck trim instead of sheepskin, fewer rivets, and a reduction of leather binding on snubbers and other fiber portions of the pad.

## CHAPTER IV

### A GUIDE TO THE PURCHASE OF FOOTBALL HEADGEAR

Safety should be of primary importance when selecting football equipment because of the possibility of serious injury. Prior to the use of plastics and molded fibers there was often a high correlation between the weight of, for example, a helmet and its safety features. Now, however, weight and bulk alone cannot be considered sufficient criteria for selection. Materials used and methods of construction are important, but so too is the proper fitting of equipment to each individual athlete.<sup>1</sup>

Probably the most important piece of equipment for the football player, from the standpoint of preventing serious injury, is the headgear. With the advent of plastic, headgears have become lighter in weight but larger and harder in an attempt to curb head injuries. Research has given the player more head protection but at the same time has proven to be quite an offensive weapon because of its size and hardness. "Investigation shows that 45.7 percent of the 430 football fatalities between

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<sup>1</sup>Virginia Bourquardez, and Charles Heilman, Sports Equipment (New York: A. S. Barnes and Company, 1950) pp. 115-16.

1931 and 1946 were due to skull fractures or brain injuries."<sup>2</sup> Players consider the base of the skull and the back of the neck as the most vulnerable and least protected part of the body. Some players believe that the present stiff plastic helmet was largely responsible for many head injuries, possibly because the helmet frequently is forcibly shoved back and down against the base of the skull.

#### I. DESCRIPTION OF TYPES OF HEADGEAR

Combination Fiber and Leather. Currently there are three types of quality football helmets. The first developed of the current types is the combination fiber covered with good grade cowhide leather panels and strips covering the surface of the fiber in order to give strength and rigidity. This type helmet has not adopted, in its entirety, the principles of 100 percent suspension which prevents direct contact of the head with any part of the shell of the headgear. All of the helmets of this general design have a hammock suspension in the crown, padded with foam or vinyl foam rubber and covered with sheepskin. The same type of padding and covering is included in the portions of the headgear which include the forehead, ears and base of the skull. This type headgear does not give even distribution of shock waves, so, much of the force is concentrated in a

<sup>2</sup>Ibid., p. 116.

small area. One definite advantage of this helmet over the other two types is that there is little chance of injury caused by the helmet being displaced on the head and causing possible injury to the base of the skull or bridge of the nose.<sup>3</sup>

The Plastic Headgear. The second of the current types developed is the plastic helmet. This headgear is the result of many years of research not only by the manufacturers but by leading coaches and medical specialists. This ball-like, hard and rigid shell, features a more ample hammock suspension made of webbing which prevents the shell of the headgear from touching the skull at any point. This type headgear was the answer to the question of distributing an impact throughout the skull and lessening the intensity at one point. However, this new plastic helmet has some negative features. Its size and type of suspension make it difficult to hold in place resulting in nose and base of the skull injuries to the wearer. The plastic material is very sensitive to weather conditions. Hot weather makes it expand noticeably and become more pliable, and in contrast, cold weather makes it contract and become very rigid. The cold weather symptoms produce a tendency to crack under game conditions. The implications are not

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<sup>3</sup>Statement by Bill Bird, Western Division Sales Representative, Rawlings Sporting Goods Co., St. Louis, Personal Interview.

that this helmet has been proven entirely unsatisfactory because of these negative features. Actually, this helmet has proven to be quite satisfactory and many of the dangerous features are being corrected.<sup>4</sup>

The Rubber Plastic Headgear. An outcome of the above described plastic helmet has been the recent development of the rubber plastic headgear. The interior suspension of this helmet is modified to the extent that the webbing is covered with either a foam rubber or vinyl foam and sheepskin, and the shell is what the name implies, quite flexible. The shell of the helmet is also fitted with foam rubber or vinyl foam covered with sheepskin, at the base of the skull and forehead. This headgear has favorable characteristics when subjected to variation in temperature. In experiments, by the Chicago Bears professional football team during the 1950 season, it was found that there was a noticeable reduction of head injuries. It was also determined that the headgear was not as efficient as the plastic headgear as an offensive weapon, and for all practical purposes, was impervious to cracking.<sup>5</sup>

Probably the next development in football headgear will be a type with padding on the exterior of the helmet

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<sup>4</sup>Ibid., Personal Interview.

<sup>5</sup>Statement by Ken Roughton, Mgr., Lowe and Campbell Athletic Goods, Chicago, Personal Interview.

which will reduce shock for the wearer and also for the opponent.

## II. FEATURES NEEDED

Research thus far has indicated that the following features are needed for adequate protection: a leather or canvas foundation, similar to a hatband, and adjustable to the size of the individual's head; a snugly fitting chin strap, a strong occipital strap or hammock with a criss-cross of canvas straps conforming to the contour of the head; all of this fastened to a plastic or fiber shell in such a manner so as at all times to prevent the shell from making any contact with the canvas webbing. A better cushion type of padding such as sponge rubber up to one inch thick, would possibly further prevent direct contact with the skull and disperse the force waves to a great extent.<sup>6</sup>

## III. RECOMMENDATIONS

Clark Shaughnessy, a well known authority on football, offers the following suggestions for selection of football helmets:

- "1. Helmets should always be comfortable. Players

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<sup>6</sup>Bourquardez, op. cit., p. 118.

will discard tight ones entirely or will loosen straps.

2. Inasmuch as size and shapes of heads vary considerably, a helmet that can be adjusted to conform somewhat to variations in shapes of the head is desirable.

3. At no point should the head ever come in contact with the wall of the helmet. Any blow at any point on the outside of the helmet should be distributed over its entire surface.

4. Materials should be used that will withstand any possible blow without denting."<sup>7</sup>

Referring to the descriptions of the three types of football helmets and comparing their features with the above quotation it is evident that both the plastic and rubber plastic headgear are acceptable.

The prices of the plastic and rubber plastic helmets, in comparable grade classifications, are practically the same. A coach should study the features of each of these helmets keeping in mind the degree that they are adaptable to the requirements of his team.

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<sup>7</sup>Ibid., pp. 116-17



## CHAPTER V

### A GUIDE TO THE PURCHASE OF FOOTBALL CLOTHING

The manufacturers of football clothing, especially the pants and jerseys, have had to combine a great deal of ingenuity, research and technical skill in developing the materials to meet the unusual demands of the game. Quality in this type of clothing specifies a wide range of attributes such as: appearance, comfortableness, careful sizing, utmost durability, flexibility, freedom of action, resistance to abrasion, ability to withstand varied weather conditions and laundering or cleaning.

#### I. TYPES OF FOOTBALL PANTS

There are two distinct types of football pants produced, however, each of these may embrace similar features. One piece pants have the hip pads, knee pads and the thigh guard built in. Shell pants, as the name implies, lack all of the protective padding, but have hanging pockets provided for inserting protective padding at the thighs and knees. In general, most coaches prefer the shell pant rather than the one-piece style because they feel that they can purchase separately better fitting and more protective

padding for the vital areas. As indicated in the description of shoulder pads and so forth, padding becomes hard and deteriorates rapidly, therefore the shell pant can be considered more serviceable because only the short-lived padding has to be replaced.

## II. MATERIALS

Many types of materials are used in producing football pants, however, the requirements of the majority of secondary schools and colleges are met with the following types of cloth: nylon satin, nylon service cloth, whipcord (army whipcord), elastic knit (two-way stretch), cotton knit, and 9 ounce duck.

Nylon Satin and Nylon Service Cloth. Nylon has the highest tensile strength of any cloth used in football clothing. The different grades of nylon depend upon manufacturers' specifications. Some nylons are 100 percent pure with no cotton or rayon, others include mixtures which often lower their quality. It must be understood that nylon is a true synthetic and its quality standards can be controlled by the manufacturer if desired. The quality and strength of Nylon Satin and Nylon Service Cloth is the same, the essential difference being the amount of lustre or sheen produced for appearance in the Nylon Satin.

The high durability of nylon fabric makes it particularly suitable for the stress and strain of football. Two outstanding properties of nylon are the ease with which it is laundered and resistance of the fabric to loss of shape and creasing. Quickness of drying and light weight are other outstanding advantages of the material. Primarily, due to its strength and ability to withstand the elements (rain and sun), nylon is rapidly replacing other types of football pant material.<sup>1</sup>

Whipcord. Second to nylon in strength, durability and demand, whipcord (army twill) fabric is the traditional football pant standby. This is an all-cotton cloth of twill weave which is essentially the same as long fiber cotton gabardine. Because whipcord is a cotton material it is sanforized to prevent shrinkage and in addition treated for water resistance. Despite the comparative lack of sheen, inherent in all cotton fabrics, this material maintains its popularity. Like nylon, whipcord is best cleaned by laundering and a feature exclusive to whipcord as compared to nylon is that it has good perspiration absorption qualities which does away with the "clinging" characteristics typical to fabrics other than cotton or

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<sup>1</sup>Virginia Bourquardez, and Charles Heilman, Sports Equipment (New York: A. S. Barnes and Company, 1950) p. 320

Elastic Knit (Two-way Stretch). This material does just as the name implies. It stretches two ways; horizontally and vertically. This is a knit fabric, a combination of rubber thread, with nylon and cotton thread wrapped around it. This is tightly knit with rayon yarn and dyed to true color specifications.<sup>2</sup>

The outstanding elasticity of two-way stretch makes it uniquely suitable for football pant material in which a snug, trim fit is essential, and where flexibility and ease of movement are equally important.

Cotton Knit. Cotton knit fabric has been used in athletic clothing for many years and has been considered a basic material for paneling and reinforcing certain stress points in football shells. In the past few years manufacturers have developed a more sturdy cotton fiber by utilizing long fiber yarns made from Pima or Egyptian cotton.

The cotton knit is a low priced pant often used by teams for practice purposes and, for those schools with small budgets. It has proven a suitable game pant which can be relegated to the practice sessions without too much budgetary costs. Cotton knit is easily laundered and for

<sup>2</sup>Sporting Goods Manufacturer (name withheld by request), "1954-55 Sales Manual", p. 4A1.

a short while will give a suitable fit but after some usage it tends to stretch out of shape and fails to give the necessary support to the protective equipment worn by the player. Compared to the more sturdy fabrics, such as nylon and whipcord, the cotton knit will not give the service, "cost-wise".

9 Ounce Duck. This is a heavy plain weave material made of short fiber cotton. The plain weave and chemical treatment of the material are identical to that of a light-weight canvas. Duck material is relatively durable but its lack of resiliency tends to make it tear at stress points such as the crotch and back of the knee. Duck pants with gussets of cotton knit, at the above-mentioned stress points, do make a good buy for football teams with low budgets.

### III. SPECIAL ORDER PANTS

In contrast to the stock football pant, which is made on a set pattern and limited to the lower quality fabrics, the special order pant offers innumerable features in styling, design, fabric combinations and craftsmanship.

Special order pants are produced in only the finer quality materials namely, nylon, whipcord, two-way stretch, and the Pima cotton reinforced with nylon knit. Combinations of the above-mentioned materials with each other or with other qualified fabrics are obtainable if desired.

Very seldom do coaches purchase an all nylon or whipcord shell. In order to duplicate the desired characteristics of a good pant, manufacturers have developed several types of flexible yet durable inserts such as the full-length insert in the back of the leg, the three-quarter insert in the back of the leg, the full-length outseam insert, the duke crotch insert which includes the crotch and both sides of the fly, and the elastic insert or "gore" in back of the knees. The quality and price of the pant depends on the type of material used in the insert and whether it is one or two ply. Insert material, for the better quality shell, is limited to reinforced worsted, two-way stretch and double cotton knit. The durability and quality of these insert materials varies. Worsted fabric is strong and fairly flexible yet has a tendency to shrink unless laundered carefully. Two-way stretch is strong and very flexible and requires no more care in laundering than the fabric with which it is combined. Cotton knit is fairly strong and is flexible but will stretch out of shape.

Manufacturers have designed the placement of inserts at the stress points on the football shell. This adds to the life of the shell and, just as important, adds to the ease of action and fit of the pant. The half and half shell combining a cloth fabric with any one of the insert

fabrics is the most popular shell produced at the present time. The best quality football pant produced is the half and half nylon and two-way stretch with the duke crotch. This combines all of the desirable features such as quality, durability, flexibility, and form fit.

Pants are sized according to waist and hip measurement. Both are important. In some style pants the length of leg varies. Pants may be obtained in regular, long and short leg length. This measurement is based on the length of the inseam.<sup>3</sup>

Below are listed details pertaining to construction that a prospective purchaser of football pants should heed:

1. Waistband lining, thigh guard pockets and knee pad pockets should be made of good grade drill cloth.
2. Outseams, inseams, seat seams, crotch piece and crotch seams should be double lapped and triple stitched.
3. The fly opening should be approximately eight inches, reinforced with webbing or tape and have not less than 6 metal or stitched eyelets on each side, equally spaced. If a zipper fly, it should be of top quality with heavy duty characteristics.
4. Pants should be reinforced with triangular leather or self material at fly base.

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<sup>3</sup>Statement by John Sand, Owner, Sand Knit Goods, Chicago, Personal Interview.

5. Crotch piece, if of self material, should be double ply and furnished with several stitched ventilation eyelets.

6. Make certain that the thigh and knee pad pockets are sized correctly for the type of pads to be used.

7. The knees should be reinforced with self material.

8. Study the type and closeness of stitching. 8 to 10 stitches per inch is desirable, however, this may vary according to material and thread.<sup>4</sup>

#### IV. STYLES OF FOOTBALL JERSEYS

Jerseys are made in four major styles: plain, supporter-style, raglan sleeve, elastic shoulder insert. Each of these styles may include features contained in the other. The plain style is a standard shirt type jersey with set in sleeves and without extra styling features, such as shoulder inserts, supporter attachment and other special items. The supporter jersey is similar in design to the plain style but has a supporter attachment that buttons on to the jersey. This styling holds the pads in place and keeps the shirt from slipping out of the pants. Raglan sleeves are the distinctive feature of the raglan jersey. The design of the sleeves permits the shoulder

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<sup>4</sup>Bourquardez, op. cit., p. 132.



and sleeve of the jersey to fit comfortably and without undue strain over the shoulder pads. The elastic knit shoulder insert style serves the same purpose as the raglan style, comfortable fit and ease of action.<sup>5</sup>

Additional features, affecting the previously described styles of jerseys, are listed below:

1. Narrow self-trim collar approximately 3/4 inch wide. This provides more elasticity and prevents undue irritation to the neck and chin.

2. Rounded, shaped neck line which eliminates cutting under the chin.

3. If desired, additional fullness at the joining of the arms to the body of the jersey. Arranged in proportion to the size of the jersey.

4. Under-arm gussets for more freedom of action.

5. Tapered waist line to prevent gathers and bulkiness at the waist.

6. Elbow pad pockets that are designed to prevent tearing out when hand and arm are inserted into the sleeve. This is a side opening instead of the old type top opening.

7. Materials used in all jerseys respond to laundering much better than to dry cleaning.<sup>6</sup>

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<sup>5</sup>Ibid., pp. 128-29

<sup>6</sup>Sales Manual, op. cit., p. 402.

## V. FOOTBALL JERSEY FABRICS

Keeping in stride with the many new developments in materials for pants, the sporting goods industry has utilized several of the fine synthetic yarns and special treated natural yarns to make combinations that have greatly increased the durability and flexibility of the present-day jersey. These new combinations also give attractive appearance, lightness in weight, added strength and all can be hundered successfully.

The method of combining the yarns in knitting the various types of jerseys, is described in the following paragraphs.<sup>7</sup>

Nylon and Durene. This jersey is made of one end of nylon and one end of durene on a 14 cut tight stitch machine. As previously stated about nylon cloth, the knitted product retains the same high quality features but is combined with durene to not only "fill" but give the jersey perspiration absorbent qualities. Durene is a durable long fiber cotton yarn treated with a glycerine solution to give it a sheen that cotton does not ordinarily have.

Medium Weight All Durene. This jersey is made of two

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<sup>7</sup> John Sand, op. cit., Personal Interview.

ends of durene on a 12 cut machine. This is not quite as tight a stitch as the nylon durene knit and because of its cotton content and "breathing" ability it is much in demand in Southern schools.

Rayon and Durene. This jersey is made of one end of rayon and one end of durene on a 12 cut machine. The specifications on this jersey are the same as the medium weight all durene, however, there is considerable difference in the durability of the two jerseys. Rayon, essentially, is a fabric designed to produce sheen and if it were not for the one end of durene included in the yarn, the jersey would give very little service. The simple addition of durene to this knit product gives this jersey good durable qualities excelled only by the nylon-durene and all durene jerseys.

Rayon and Cotton. A combination of one end of light rayon and one end of 10 to 1 cotton, this jersey gives good appearance at a low price. Because this is a light thread of rayon and short fiber cotton the durability qualities of this jersey make it a questionable bargain. The low tensile strength of this fabric has been proven by a consistent pattern of stretching out of shape rapidly and tearing at many of the stress points.

Light Weight Durene. This jersey has only one end of light weight yarn made on a 14 cut tight stitch machine. Sometimes called the "Breakaway", it is so light that most of the sporting goods companies will not guarantee its durability. The market for this type jersey is the schools and coaches that desire speed and some resistance to tackling, preferring, of course, that the jersey is torn off of the ball carrier preventing an important tackle.

Light Weight Nylon and Durene. This jersey is made on a 14 cut machine in an extra tight weave. The one end of nylon and one end of durene are made of a much finer yarn fabric which produces the lighter weight. This is a fine quality jersey embodying two important features of lightness and durability.

Practice Jerseys. Most manufacturers designate their all cotton jersey, natural or colored, as practice jerseys, however there is no reason why it cannot be used as a low cost game jersey, especially the colored ones. In general, cotton knit is difficult to judge in quality and durability, however, there are two important features to check before purchasing a large quantity of this type of stock jersey. The "fuzzy" and sometimes thick feeling jersey that has a minute weave is, many times, made of inferior short fiber yarn. This particular jersey should be put through tests

to check its resilience and shrinking qualities both in breadth and length. The hard finish dominant weave cotton jersey should also be given rigid tests to check, especially, its tendency to stretch in length.

There has recently been developed a low priced combination 17 percent nylon and 83 percent cotton practice jersey. As a rule, a combination yarn, with the less dominant yarn under 35 percent, will show no appreciable increase in quality. However, the 10 percent additional cost of this garment is so slight that careful consideration should be given to the relative value of 17 percent nylon compared to a like amount of cotton.<sup>8</sup>

Below are listed details pertaining to construction that a prospective purchaser of football jerseys should heed:

1. Shoulders should be of double thickness self material. Seams should be of good quality thread and either merrowed or zigzag stitched.
2. It is preferable that all contrasting colors be built into the jersey during the weaving process. Set-in bands of self material reduce the resiliency of the garment because of the addition of seams.

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<sup>8</sup> John Sand, op. cit., Personal Interview.

3. Elbow reinforcing patch and pocket should be of adequate size, 6 by 9 inches is recommended.

4. The bottom and all edges of the jersey should be hemmed with a covering stitch preferably chain or zigzag.<sup>9</sup>

## VI. NUMERALS

Numerals for football jerseys may be obtained in nylon, whipcord, satin, tackle twill and felt. The individual quality of each of these has been discussed in the preceding pages of this chapter. No matter what type of fabric is selected for numerals it is wise to specify that they have rubberized backing for "body" and durability. Nylon, whipcord and tackle twill are the preferred fabrics for lettering. They are durable, will not shrink with laundering and, with the exception of whipcord, they provide a desirable sheen that compliments the appearance of the entire uniform. Even though satin has a good sheen it is not a desirable material for football numerals because it unravels easily under extreme stress. Felt, in years past, was the standby for lettering and numerals but has been appreciably supplanted by the aforementioned fabrics. Felt has no sheen and fades and shrinks under laundering conditions.

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<sup>9</sup>Bourquardez, op. cit., p. 130.

An important point to consider is the size of the numeral. Size of numerals varies from the official minimum of 6 to 10 inches on the front of the jersey. On the back the variation ranges from 8 to 12 inches. Many coaches prefer the maximum size for identification purposes, however, it is important to consider that the larger the numeral the more reduction in resiliency and ease of action in the jersey.

## VII. RECOMMENDATIONS

The purchase of football clothing necessitates careful consideration of many conditions relevant to the features desired by a coach or team. Bourquardez and Heilman offer several important suggestions that are valuable for the proper selection of clothing.

"Any consideration of clothing for football must be based on the need for fabrics that are durable and flexible, and for styling that permits great freedom of action, in spite of the equipment over which the garments are worn. Adequate size is also an important factor, as is lightness of fabric, since the player is already burdened with the extra load of padding. The varied weather conditions under which the game is played call for fabrics that are resistant to dirt and mud, and at the same time have excellent moisture absorbency for the absorption of

perspiration. Garments should also be highly resistant to abrasion. Fabric weight and type must be varied to suit the climate in which the game is played. A slick surface is desired so that tacklers will find it difficult to secure a firm hold on the garment. Finally, it should be possible for all garments to be easily cleaned, preferably washed."<sup>10</sup>

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<sup>10</sup>Bourquardez, op. cit., p. 128



## CHAPTER VI

### A GUIDE TO THE PURCHASE OF THE FOOTBALL SHOE

#### I. FOOTBALL SHOE LEATHER

Uppers. There are two things that companies constantly strive for in upper leather. The first is strength with a minimum of weight, and the other is softness or pliability. The strongest lightweight leather made is kangaroo. Yellow back kangaroo has always been, and still is, used in the best grade athletic shoe. For many years it was made by what is known as a straight vegetable tannage process. While this produced very soft leather, it actually was not strong enough for use in athletic shoes. Tanners have, in recent years, developed a formula combining vegetable and chrome tannages for these skins. This process retains the "glove-like" feel of the leather and in addition, makes it very strong.

All blue back kangaroo leather is straight chrome tanned. Although the blue back leather does not have as much strength and the "glove-like" feel of the yellow back, it occupies a position just under the yellow back kangaroo for lightness, strength and pliability.

The other principal upper leather used is a special

athletic tanned cowhide. For many years football shoe manufacturers purchased cowhide upper leather in the open market from tanners who produced "elk type" leather intended principally for use in work shoes. Because it is impossible to obtain such leather consistently in the weight and texture most suitable for athletic shoes, many of the better manufacturers arrange to have their cowhide leather tanned according to their own specifications. In many cases, these manufacturers supplied their own choice cowhides to the tanner thus assuring uniformity.<sup>1</sup>

## II. BOTTOM STOCK

Most manufacturers of the better Goodyear Welt construction football shoes place a top quality degraigned leather insole in their shoe. An explanation of why the type and grade of insole is important will be made in the portion of this chapter which describes the Goodyear Welt construction. All taps (toes) and heels on shoes made in the sprint-type construction as well as all outsoles in shoes which have a straight leather sole, are cut from oak-tanned, oil treated leather. Manufacturers of low grade shoes, many times, use a fiber substance similar to pressed paper for counter and tap construction. This latter material

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<sup>1</sup>Spotbilt Athletic Shoes, Inc., Chicago, Ill., Personal Visitation and Notes, Dec. 28, 1954.

has very little water resistance and will not give the protection and support desired.

Steel Parts. The steel parts used in the better grade of shoe are the result of years of research. The heel and sole inner plates are made of high-tempered spring steel, treated in order to prevent corrosion. All other parts, such as bolts, nuts and washers are treated against corrosion and tempered in order to retain threads and original shape.

Welting. Welting in shoes with leather outsoles are special tanned and treated with an anti-mold compound. Shoes with airo-lite outsoles have a plastic welting which, because of its chemical components, does not absorb moisture.

Insole Liner. Practically all of the better grade foot-shoes, regardless of type of construction, have a sponge rubber cushion insole liner covered with a moisture resistant cotton drill material which prevents the sponge rubber from shredding.

### III. CONSTRUCTION

Goodyear Welt. In this method the upper and sole are ingeniously joined to obtain a firm attachment, and yet are not sewed directly together. The construction of

Goodyear Welt shoes is unique in the formation of two seams in the attachment of the shoe bottoms. The first is a hidden chain stitched "inseam" holding together the upper, lining, and insole, all of which are attached to a leather welting. The outsole then is sewed to the welting by the Goodyear Lockstitch machine creating the second seam. Because this Goodyear Machine and a welting are used, the construction is known as a genuine Goodyear Welt. All of this work is done while the last is in the shoe so the uppers have the greatest possible length of time to dry on the last and conform to its shape.

A shoe made in this manner will hold its shape under actual wearing conditions longer than when any other construction method is used. For this reason, all of the better grade men's street shoes are made in the Goodyear Welt construction. Because of extra materials such as the leather welting, and the number of extra labor operations involved, Goodyear Welt shoe construction is more costly than any other being used in shoemaking today.<sup>2</sup>

Littleway Lockstitch. The outsole, upper and insole are held together by means of a lockstitch seam which is sunk in a groove in the outsole. This necessitates the

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<sup>2</sup>Ibid.

operation being done with the last out of the shoe. While this construction is strong and serviceable, shoes made in this manner do not hold their shape in actual service as long as the Goodyear Welt shoe because no welting is used and the last is removed before the leather becomes dry.<sup>3</sup>

#### IV. LASTS

It is almost impossible to overstress the importance of having the proper "last" for any kind of shoemaking, and particularly so, when it comes to athletic shoes.

A shoe last is a form made out of maple wood shaped as nearly as possible to conform to the outline of the human foot. Unless this last is designed properly, an ill-fitting and unsatisfactory shoe will result, even though the highest quality materials are used. In designing lasts for athletic shoes, it is not only necessary to incorporate the proper measurements, but also to build in such features as correct foot alignment and balance. The player using shoes made over such lasts will find them not only comfortable, but also obtain the utmost in quick starting and speed, with the minimum of leg and muscle strain.

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<sup>3</sup> Ibid.

The lasts over which the better manufacturers construct their shoes have been adopted after exhaustive tests. These athletic lasts are the result of tests under actual playing conditions on fields of leading colleges and universities in all parts of the country. Reports from these tests, and from players wearing regular stock shoes, almost unanimously stress comfort, fit and a feeling of balance, whether stand-in or running.

It is not only necessary that the last is correct, but the patterns drafted over it also must be fitted and designed properly. This requires the work of expert craftsmen specializing in athletic shoe work only. Involved in pattern making are such steps as cutting the original models, molding to the last, grading into different sizes, and attaching metal binding to the patterns without distorting any of the measurements. From the patterns are constructed exacting steel dies which enable the manufacturer to cut the leather uppers by machine.<sup>4</sup>

#### V. REMARKS

In general, the well known manufacturers of football shoes conform very closely with respect to types of leather used, welt construction, counter material, insoles,

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<sup>4</sup>Sporting Goods Manufacturer (name withheld by request), "1954-55 Sales Manual", pp. 18B3-18B4.

construction of outer-sole, steel parts and cleat construction. However, there are distinct differences in various makes of shoes as pertains to fit, foot alignment, balance, and reinforcement of leather uppers. It is recommended that people in the position of purchasing or coaching make actual tests with the various grades of the manufacturers products. There are certain brand shoes that can be distinguished for their superior quality leather or web reinforcement of leather uppers. There are shoes that have comparable material quality but lack that feature of the true craftsman's art, fit.

Similar to the attitudes toward the various brands of footballs, tradition and psychology have much to do with what brand of football shoe is used by a particular team, however, unlike footballs, there are features in the several football shoes that appeal to individual differences.

## VI. RECOMMENDATIONS

Football shoes are one portion of equipment that is many times not given serious consideration. Leading manufacturers have given much time and research to building shoes that combine features of fit, durability, flexibility and light weight.

As indicated previously in this chapter, the better

shoes are Goodyear Welt construction and no matter whether the straight or split shank shoe is desired, this type of construction should be required if the budget will allow.

Most coaches prefer the light-weight yellow-back kangaroo for the backfield men and ends. The same is sometimes purchased for linemen especially if they are used to run interference. Other innovations can be obtained, such as hard toes, a kicking toe, oxford style shoes and special light-weight shoes meant for fleet-footed backs only.

The above suggestions were made with little reference to the well-known limited budget. If such a situation exists it is advisable to substitute blue-back for yellow-back kangaroo. There is very little difference in the durability of the two leathers and a savings of approximately twenty per cent can be made. On the same limited budget basis it is recommended that linemen be furnished with good grade Goodyear Welt construction cow-hide shoes. This shoe leather is heavier than the kangaroo but can withstand very hard use.

If the school is unable to purchase cleats to meet the various gridiron conditions it is best to select the soft rubber type. As for efficiency, there is little difference in the "male" and "female" cleats, however, most coaches prefer the male cleat for reasons of protection (no bolt



posts sticking out of the sole if cleat should come off)  
and because the posts that support the "female" cleats of-  
ten become loose and unusable.

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